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ROADMASTER AND FOREMAN

BRIDGES--BUILDINGS--CONTRACTING--SIGNALING--TRACK

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CHARLES S MEYERS, President
C. C. ZIMMERMAN, Treasurer
W. A. D. SHORT, C. E., Editor
A. M. WOLF, C. E., Assoc. Editor
Contributing Editor: J. G. VAN ZANDT, C. E. (Economics)
CLAY C. COOPER, General Manager

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CONTENTS.

Editorial—
The Valuation of Railways 41
The American Wood Preservers' Association 41
The National Scale Experts 42
The Railway Situation 42
The Manufacturers' Situation 42
A Big Traction Problem 42
Copy "Engineering" 42
Pennsylvania Booklet 42
Technical Association Secretaries 43
Address of Vice-President Atterbury 43
Seating Capacity of the Chicago City Railways Outbound Cars 44
A Publicity Campaign 44
Orders for Railway Steel 44
Circa Railway, Colombia 44
The Valuation of the American Railways 45
Railway Construction 46
New Stations on Southern Railways 47
Railway Structures 51
The Iowa Central Black Hawk Chute Bridge 52
Iron and Steel 54
Concrete Department—
Editorial—
Waterproofing Solid Floor Bridges 55
Hooped Reinforcement for Concrete Columns 55
Hydrated Lime in Concrete 56
Glenmore Bridge, Philadelphia & Reading 57
Missouri Pacific to Build Viaduct 60
Louisville & Nashville Bridge Contract 60
Stillwell Creek Arch Bridge, Baltimore & Ohio 62
Current Prices—Concrete Materials 62
New Books 63
Semi-Annual Meeting National Association of Scale Experts 65
The Maintenance of Way Department—
The Mechanical Life of Ties as Affected by Ballast 69
The Signal Department—
Single Track Automatic Block Signals, D., L. & W. 71
The "Engineer's Distress" 73
Personals 74
With the Manufacturers 75

The Valuation of the Railways

In another part of this issue we publish the third of a series of papers showing in detail the methods being pursued by the railways in endeavoring to attain the requirements of the bill authorizing the Interstate Commerce Commission to procure a physical valuation of the common carriers. There is no doubt that this act originated in and was caused by the quasi-fanatical spirit of vituperation that seemed to be the popular demand against organized capital in general and the railways in particular five years ago. As stated it was founded "in in-equity" and the impracticability of the act is shown in its first item of requiring the "Original Cost to date" to be procured. We sincerely hope that Congress will see the inadequacy of its ways in this respect and relieve the Interstate Commerce Commission of this burden. If this relief is not granted this one item will assure the physical valuation of being the "white elephant" it has been called. Several issues ago we called attention to the fact that the work of this valuation was progressing at a most unsatisfactory rate, owing principally to the fact that the Commission was handicapped by insufficient appropriations from Congress. And as a consequence it was going to cost both the Government—and hence the American people—and the railways many times the amount the Government representatives had announced. The article in this issue corroborates our prophecy. Within a few weeks of a year since the Act became a law we find that there has been very little progress, actually less than 4,000 miles or about 1½ per cent of the total mileage. Assuming that it took the Commission six months to properly organize their forces and that the ensuing year will see double this amount accomplished, we would than have completed 4½ per cent, so it will take in the neighborhood of 22½ years longer to complete the work. This is a most unfavorable comparison with the first estimate of five years.

The American Wood Preservers' Association

At the annual meeting of this association held in Chicago the latter part of January the attendance was unusually large and the papers of great interest, some of them particularly so to railway engineers, one of which we publish in this issue. It is interesting to note that it has only been within the last 12 years that the question of timber preservation has been seriously, scientifically, and thoughtfully investigated in this country. Today it is universal and the well organized, scientifically conducted timber association is one of the results of the constant efforts of a handful of men. The whole question is another example of the fearful, careless waste of nature's richest endowments that has gone on in this country for years. It is much to be deplored that the Timber Preservation Association did not come into existence fifty years prior to its inception. Timber preservation scientifically is only new in this country, of former prolific timber resources, as the Egyptians were thoroughly familiar with the process and used it on

woodwork of various types with excellent results several thousand years before the Christian era. There are examples of their work still extant showing a perfect state of preservation.

The National Scale Experts

We publish in this issue the full proceedings of the semi-annual convention of the National Scale Experts. This convention brought forth some interesting and instructive discussions on track scales. In our last issue we called attention to the fact that this matter of scale specifications and tests should be handled by the Federal Government. A discussion at the convention bore us out in this respect, as one of the points elucidated was that the State of Minnesota was the only state, represented at the convention, which was properly equipped for having its inspectors examine, report, and test track scales. It is to be regretted there was a verbal clash between representatives of rival scale manufacturers. The convention floor of a gathering of representative men and prospective buyers is no place for the venting of animosity, personal or business, of manufacturing competitors. On the other hand, it is not the most approved practice for associations of this character to give full membership privileges to industrial representatives, on account of this very reason. As to the matter of testing scale levers, another important point, and that is tests of this character should be carried out in a room,—or a deep, free from water-action, foundation, which is free from contact with any other structure,—with an even temperature and perfect freedom from air currents. These tests made in a vibrating manufacturing building are not compatible with good results, as the consequent errors of indication will cause dissatisfaction to all concerned. Proper Federal regulation would eliminate this. Witness the splendid equipment, for the testing of all manner of delicate instruments, in our Naval Observatory at Washington.

The Railway Situation

The granting of the increase in rates in eastern classification territory by the Interstate Commerce Commission has restored, in a large measure, the confidence of the public in the railways and the railways' confidence in themselves. The various State Commissions seem to be willing to lend a helping hand and are mostly inclined to allow the railways to increase intra-state rates, particularly passenger rates, as they seem to be convinced that the railways are entitled to it, as a "fair return" on their investment. Large orders for steel, both for rail and structures, have been placed within the past month and correspondingly large orders for special appliances, signaling and interlocking, are being contemplated, but in the natural course these will not be placed until the bulk orders are taken care of. Most of the railways still have to perfect financial arrangements to take care of betterments as the increase in rates will neither furnish immediate nor sufficient pecuniary relief. This is lost sight of by those who have expected to see immediate results from the railways in the placement of large orders for variegated appliances, betterments and equipment.

The Manufacturers Situation

We called the attention, several months ago, of the manufacturer of railway appliances to the fact that this was the time to secure the attention and consideration of those who will later base their recommendations for future purchases on what you now teach them.

Apparently this has not been heeded, as never before have manufacturers been so chary about the display of their wares, either by way of advertisement or in number of sales representatives. This would not be so significant if it only applied to the financially weak, but the supposedly financially strong are as chary, if not more so, than the weak. This is the time of all others for an educational and advertising campaign in order that the prospective buyer of the next few months, the railway official, will be familiar at first hand with the wares that can be procured. It would seem as though these manufacturers are among those that expected the immediate disbursement of money by the railways the moment the rate increase was granted.

A Big Traction Problem

On a separate page we publish a table showing the inadequacy of the traction company of the second biggest city in the country to meet the demands of the traffic. Some time ago it was suggested to the Public Service Commissioner that trailers be attached to the regular motor cars, these trailers to have a greater seating capacity, on account of the platform and controller space being filled with seats and the doors being on the outside side of the center of the car. The commissioner stated that this had been recommended, but on account of an agreement between the labor union and the traction company as to the number of men to be employed on a car it was not feasible to do this. When the people of as large a city as Chicago are discommoded and made miserably uncomfortable daily simply on account of a labor agreement it seems to us high time for drastic measures to be used.

PENNSYLVANIA BOOKLET.

The Pennsylvania Railroad System has just issued a booklet, for distribution at the Panama-Pacific International Exposition in San Francisco, describing its activities and exhibit at the exposition.

Accompanying a map for the entire system, which is printed in the center of this booklet, are statistics showing the extensiveness of the system, which serves:—

"Fifty-two per cent of the entire population of the United States. It has 11,729.92 miles of length, and 26,200 miles of track; 250,000 employes, 7,561 locomotives, 6,884 passenger cars, 281,590 freight cars, and 68 steamers and ferry boats, directly serves fifteen of the forty-eight states of the Union and the District of Columbia, whose combined population is 48,227,840. All but two of the ten largest cities in the Union are directly on its lines, and its 4,500 stations are at the command of twenty

cities each with a population of over 100,000; one hundred and fifty each with a population of over 10,000 and two hundred and sixty-three each with a population of over 5,000."

The railroad's booklet contains a photograph of the relief map of the Pennsylvania System—the largest relief map ever made, being 42 feet long and 26 feet wide. It also contains a picture of the proposed Union Station in Chicago, the main span of the East River bridge, and a model of New York City. A photograph of the latter is also reproduced in colors on the cover page of the booklet. This model of New York City shows the city just as if one was looking at it from an aeroplane. It reproduced faithfully not only the main physical features of Manhattan Island and the surrounding country and water courses, but the prominent buildings, the streets, the bridges spanning East River, the parks, and squares.

The Pennsylvania Railroad System's exhibit at the San Francisco Exposition is in charge of the traffic department. Mr. H. T. Wilkins, special agent, being the company's representative there.

TECHNICAL ASSOCIATIONS' SECRETARIES

The first annual meeting of the Society of Technical Associations' Secretaries will be held in the rooms of the American Society of Mechanical Engineers, 29 West 39th street, New York City, on Saturday, February 27, at 10 a. m.

The following is the provisional program: 10 a. m., business session; 1 p. m., luncheon at the Engineers' Club; 2:30 p. m., afternoon session.

In the afternoon the session will be opened by an address by Mr. Vought outlining his views of the scope of the society. The following are to be invited to open the discussion: Dr. Edgar Marburg, secretary of the American Society for Testing Materials; Mr. Charles Warren Hunt, secretary of the Society of Civil Engineers; Mr. George P. Conard, secretary of the Association of Transportation and Car Accounting Officers, 75 Church street, New York, and Mr. Calvin W. Rice, secretary of the Society of Mechanical Engineers, followed by a general discussion. It is expected that Mr. Vought will make the effort to get Mr. Allen to outline in what way the railway managers and operating officers of railways can be benefited by the society.

Mr. Vought will also get B. W. Frauenthal, or other representatives of the railway clubs, to speak on how the railway clubs, as such, can be benefited by the society. Dr. Marburg, Dr. Hunt and Mr. Calvin W. Rice will speak for the technical societies.

Address of Vice President Atterbury

An Address on the American Railway by the Vice President in Charge of Operation of the Pennsylvania

W. W. Atterbury, vice-president in charge of operation of the Pennsylvania, delivered an address February 9, 1915, before the combined commercial organizations of Philadelphia, including the Chamber of Commerce, the Bourse, Board of Trade, Merchants and Manufacturers' Association, and Manufacturers' Club. He said in part:—

"The American railroad is the greatest transportation achievement of the world because it grew up in an age when enterprise, initiative and energetic business ability had unrestricted opportunity for development. * * *

"I am not one who believes that railroad activities should now be unrestricted. I believe in regulation. Railroads have benefited in ways many of them little realize from regulation. Regulation is here to stay, and it is the duty of the railroad officer to co-operate in making that regulation a continued benefit not only to the country but to the community.

"Regulation has largely confined itself to correcting abuses. * * * We have been devoting so much attention to killing the weeds in our transportation garden that we have neglected the very important duty of cultivating and strengthening the growth of the healthy and useful plants.

"The great transportation machine of this country was and is sound. It needs continued regulation, but the regulation must be competent and sympathetic. The most pronounced weakness of our present regulation is that so much of it is incompetent. Laws are lightly passed by legislatures without any real knowledge of what is involved. Action is taken by commissions who can have no full conception of the delicate mechanism they are handling, nor of how the public interests may be finally affected by their lack of experience and training.

"The supreme need in railroad regulation is competent regulators; but the appointment of men with such qualifications is not likely to be promoted under a political system where public office, for a short term of years, is almost wholly a reward for party fealty; nor can we look to the political parties themselves to improve matters. The business men of the country, whose welfare is so intimately interdependent with our transportation system, represent the class of citizens from whom the initiative should come in putting a new spirit into our system of regulation. We need scientific management in business, but we need also scientific management in regulation, or it must and will result in strangulation.

"No step, in my judgment, could be taken by the business men of the country which would be more fruitful of practical benefit to the business life of this nation than practical action to insure that when a man is appointed by either the Federal Government or a State, to regulate our railroads, he shall be qualified by experience and training to consider and pass upon, constructively and helpfully, the many important questions which will come before him.

"To be concrete, my suggestion is that a minority of the railroad commissioners of the states and nation should consist of men trained in the practical conduct of railroad affairs. I suggest that all appointments should be for life or during good behavior; that the salaries should be such as to attract the ablest brains in the country; and that these positions should be surrounded with such prestige and honor that any citizen would feel that he could serve his country and his fellow man in no more exalted capacity than in representing the people in promoting, encouraging and regulating the development of its transportation agencies.

"The country and its commerce cannot progress while the railroads are weak. I need offer little proof of that, after our business experiences of the past few years. Let me say, however, that the question of the welfare of the transportation interests is a personal matter with every citizen. The railroads pay annually, in round figures, $140,000,000 or more in taxes; they are the purchasers, under normal conditions, of one-third of all the steel, iron and lumber products of the country, and of many other extensive lines of supplies and material. They employ about 1,700,000 persons.

"Now is the most opportune time for you to make your influence felt when these great transportation systems are endeavoring to shake off depression and encourage business enterprise, and to forget the conditions of 1914."

Seating Capacity of the Chicago City Railway's Outbound Cars

Interesting Data Compiled by Service Commissioner. "Engineering" Showed Diagrammatically in November

The detailed checkings of seats and passengers for outbound cars in September, as read by Mr. Ferry, were as follows:

	5 p. m.		5:30 p. m.	
Checking Station—	Pass.	Seats.	Pass.	Seats.
BRIDGES.				
State street	1,500	1,200	2,000	1,200
Dearborn street	400	600	800	700
Clark street	300	500	1,000	500
Wells street	1,200	800	2,000	1,000
Randolph street	2,700	2,400	4,400	3,100
Madison street	3,000	1,500	3,500	1,500
Adams street	1,100	900	1,200	900
Van Buren street	1,300	800	2,100	1,000
Harrison street	200	200	400	200
TUNNELS.				
La Salle	3,100	1,600	4,200	2,100
Washington	2,200	1,600	3,200	1,600
Van Buren	900	700	1,700	800
HARRISON STREET.				
Fifth avenue	1,000	800	1,900	1,200
Clark street	2,900	1,600	4,100	2,100
State street	3,400	2,300	4,900	2,800
Wabash avenue	3,700	3,300	4,400	3,690

A Publicity Campaign

The Michigan Railways Have Taken the Initiative in Presenting Their Difficulties Directly to the People

The Michigan railroads have started a campaign to arouse popular sentiment in favor of a law permitting an increase of passenger fares. This is a vigorous, sound and unique move on the part of the railroads. It is, moreover, a precedent that other railroads may well keep in mind. There is no better way for the railways to build up a popular interest in their needs and support for their plans than for them to go before the public with a frank and forcible presentation of the exact situation.

But the chief point about this speaking campaign is that it shows the distance that the railroads and popular sentiment have measured from the old days when railroads and people seemed to act more or less on the theory that their interests were antagonistic, or at least on the theory that a direct communication and understanding between them was impracticable, it having been the habit in previous years for each side to constantly lose sight of the fact that their interests were neutral and only required a meeting to amicably readjust all differences of opinion. This publicity campaign is just such a meeting and should bring forth excellent results.

Orders for Railway Steel

The unfilled tonnage orders of the United States Steel Corporation for January by preliminary estimates are fixed at 150,000 to 200,000 tons. The *Iron Age* says that operations in the company's plants are now on a basis of nearly 55 per cent of capacity. This compares with about 35 per cent at the beginning of the year. Railroad equipment orders since the first of the year have amounted to more than 450,000 tons. There is undoubtedly a feeling among the railroad managers that money will now be obtainable and while real buying has not yet begun in volume, each week adds to the total. Orders this week include 28,000 tons of rails for the Erie, for which the steel corporation has the contract. The Baltimore & Ohio is reported to have closed for 25,000 tons, and the "Soo" system is in the market for 15,000 tons.

CANCA RAILWAY, COLOMBIA

The Gauca railway in the Republic of Colombia, South America, the building of which was commenced in 1878, has recently been completed to Cali, which was the terminus originally contemplated.

This road runs from the Pacific seaport of Buenaventura across the western ridge of the Andes for a distance of 110 miles to Cali, which latter city is the capital of the flourishing department of the "Valle del Gauca."

Work has now been commenced on a further prolongation of the road towards the north and another to the south towards Popayan.

The people of Colombia are justly proud of the progress of their country, which has been continuous during the many years of peace and prosperity which they have enjoyed under the stable government of the present and several previous administrations; and are particularly gratified that the completion of this railway is due to native enterprise and capital, which have combined to complete this work of improvement and development with greater energy and more satisfactory results than those accomplished by the various foreign corporations engaged in the work of its construction from 1878 to 1907, during which period, including 12 kilometers (about 7½ miles) constructed by native contractors, but 34⅜ miles of road were completed.

Preliminary plans are being prepared by A. H. Dimoch, city engineer of Seattle, Wash., for grade separation work at Argo station. Plans may be ready for bids by latter part of summer.

The Lake Erie & Youngstown has been asked to advise the state commission whether it intends to go ahead with the construction of the projected line which is to connect Conneaut and Youngstown or whether it is to be abandoned.

The Memphis, Dallas & Gulf is preparing to lay 16½ miles of track to close the gap north of Murfreesboro, Ark.

The Meridian & Memphis, according to a report from Meridian, Miss., has secured right of way and is beginning construction of its proposed extension from Union westward to Sebastopol, Miss., 15 miles, the contractor being the Prudue Construction Co.

Stockholders of Ogden, Logan & Idaho Ry. (interurban) will vote Feb. 1 on bonding for $10,000,000. It is reported that a large part of this sum for extensions (including one to Logan) are for future improvements. The company is a consolidation of the Ogden and the Logan Rapid Transit companies. Royal Eccles is secretary.

Right of way has been secured and it is reported construction will be started this spring on Palm Beach & Everglades, proposing a line from West Palm Beach, Fla., to point on Lake Okeechobee.

The Valuation of the American Railways

The Third Article on This Vital Subject by H. H. Edgerton, Assistant Engineer, Chicago Great Western, Showing Fallacy of Government Valuation

It has been announced that the Interstate Commerce Commission has finished the valuation of five of the railroads of the United States:

Atlanta, Birmingham & Atlantic, 645 miles.
Norfolk & Southern, 907 miles.
New Orleans, Texas & Mexico, 287 miles.
Texas Midland, 125 miles.
San Pedro, Los Angeles & Salt Lake, 1,100 miles.

Compared with our many really great systems these are minor roads, and probably are easy propositions to tackle. The longest one, the Los Angeles, San Pedro & Salt Lake, is of recent construction, so that it has but little hidden from first glance view in the way of old abandoned roadbed, ballast, rivetments, bridges, pipe lines, etc., and could be more easily invoiced than many of the roads that were built years ago. It will be interesting to know how close the government engineers can come to getting a correct value. The commission will have to hear both sides—the railroad's valuation and that of their own engineers. In the meantime the public will be very interested to know how the government's valuation compares to the capitalization of those roads. The valuations of the Wisconsin and the Washington state railroad commissions showed the roads to be under capitalized, and therefore their valuations were called no good by a great many of their confreres, but perhaps they did represent the actual conditions, and that Prof. Pence and Mr. H. P. Gillette are not to be blamed for stating things as they found them.

The truth is, railroad valuation by law had its start in inequity, not in equity. The parents who fathered it intended it to hurt somebody. It was a measure of reprisal; an arm of vengeance in the form of law, calculated to make all railroad corporations out as rascals, charging for freight rates on values they did not possess.

As we look over the past railroad construction field it is the most free from scandal of any group of large undertakings of great construction. No one accuses the railroad promoters or construction men of "blowing" the money away. There is no talk about their waste and extravagance and poor workmanship, the way there has been about such works as the New York earlier aqueducts, the Los Angeles acqueduct, etc., a list too long to mention. The organization and workings of the constructive and operating personnel has worked well from the board of directors, down through the president, the engineers and contractors, to the hoboes who did the shoveling, and few there are who bore the ignomy of making too much money. If there has been anything crooked done it has been in Wall street, but even they have been cautious, for Wall street above all is a cautious thing to get value received for its money.

As a general thing railroads were constructed on the contract principle. The work was let to the lowest bidder. The price ruined the contractor, and he in turn ruined the hobo, and the latter, poor fellow, only came out with his overalls and board. As the old saying is, "Many are the railroads that have been built on overalls and tobacco." A great many of the roads were built by individual help of the surrounding citizens. To construct the Seattle & International, the merchants and people of Seattle shut up shop one day each week and went out and helped dig. The Oregon Short Line was largely constructed by the Mormon farmers using their own teams, hence the name "Polygamy Central," which has never left it, unjust though it is, and the road is very much a credit to the sacrifices of the early settlers. Very large are the numbers of our present railroads that were presented with free gifts of hundreds and thousands and millions of dollars, and if it was cash money it was only sparingly given out again to the contractor and his hoboes. Of the contractors how many does anyone know who made successes, and how many failures? There are probably ten failures to one success. It is doubtful if there is an engineer who can count among his acquaintances ten successful contractors, and if he is an old timer he has probably seen hundreds go down in failure, and of these failures, but few of them have been through incompetence. It has been mostly due to too low a price. Now if the Interstate Commerce Commission is fair and square the railroads will reap the benefits of these low prices at which the construction was made, for the act specifically says, "the cost to reproduce," and they could not be reproduced for anything like their original cost. The prices are higher now, and if considered in the light of present economic views it is only fair that the contractor and his men should make a little money.

The early results of the government valuation are earnestly desired by the public. These results would look best if stated graphically in miles per inch, showing how many miles are done and how many remain to be done. Also in cost per mile; how much has been spent and how much will yet be needed. A year is up. The commission is a public institution paid by the people of the United States, so the people have a right to know these things. We would like to know whether we have a small mechanical toy or a "white elephant." The politicians who intended to hurt some one would also like to know what sort of a boomerang they let go.

Quoting from the words of Mr. E. Holbrook of the Union Pacific:—

"The Act makes it mandatory that the Interstate Commerce Commission do many things, probably half of which are physical impossibilities, and this the commission is beginning to understand very rapidly. I am of the opinion that when the commission makes a progress report on valuation to Congress, and shows that with an expenditure of from two to three million dollars it has one or two per cent of the work finished, that many years will be required to complete the task, and at a cost to the Government and railroads jointly of no less than one hundred and fifty million dollars, Congress will probably strike out of the act many of the present requirements and modify others. I am quite certain that the commission has in mind at this time recommending to Congress the dropping out of the item 'Original Cost to Date,' and making it optional for the carriers to introduce such original cost to date as they may wish, to support their claims of the cost of reproduction, thus relieving the Government of considerable expense and throwing more onto the roads.

"I have hoped and still hope that this valuation work may proceed, before being knocked out entirely, to the point where it will have established with reasonable certainty the fact that the railroads as they exist today could not be reproduced for their present capitalization. This will result, I believe, when the commission has worked out the cost of reproduction of 15 or 20 representative roads, provided it makes reasonable allowance for the necessary time for construction, which largely governs the item of interest, as well as a reasonable allowance for the cost of perfecting an operating organization, and for the item of solidification and seasoning."

And quoting from Mr. F. A. Johnson where he says:

"Physical valuation of the property owned or operated by the railroads of the United States, as provided for and directed in the

Act of Congress approved March 1, 1913, is going to be an abject failure.

"So far as accomplishing anything along the line of practical results are concerned, the Valuation Division of the Interstate Commerce Commission might just as well hang up all the various implements employed in a work of impossibility, and tell Congress that it is unable to proceed. And that is just about what is going to happen. When the annual report of the commission is completed, it will have a chapter relative to physical valuation which will show that the very existence of the La Follette act, providing for the general appraisement, is its greatest difficulty.

"The act will have to be amended in several provisions, and more restrictions removed, before the large corps of experts in charge of the work can make anything like a presentable showing.

"In the first place the Interstate Commerce Commission is stuck, stalled and stranded on the proposition embodied in the very first instruction laid down in the La Follette act. They are admonished and directed to obtain "the original cost to date," a task as absolutely impossible as it would be to make a careful and detailed inventory of Noah's Ark immediately preceding the deluge, and then again after that rainy period was over."

RAILWAY CONSTRUCTION

A contract has been let for building a railroad from Willcox, Ariz., east to Dos Cabeza, 14 miles. The line is to be built by the Mascot Copper Company to provide an outlet from its mines. T. N. McCauley, San Francisco, is president.

The Buckhannon & Northern has completed surveys for a line from Fairmont, W. Va., to Clarksburg, 25 miles, and will, it is believed, start construction as soon as the line into Fairmont is completed.

The Burlington, Mississippi River & Northern has been organized for the purpose of constructing a railway from a point near Arpee to Milan, Ill., to connect with the Chicago, Rock Island & Pacific.

The Canadian Northern has been authorized to open for traffic the line from the junction with the Balke River subdivision north of Camrose, Alta., to a junction with the Canadian North Western near Strathcona.

Surveys are about finished by the Canadian Northern Ontario for a line to be built from Toronto, Ont., to Niagara Falls.

The Canadian parliament is being asked for an extension of time by the Canadian Northern in which to build from Rawdon, Que., northerly to the National Transcontinental, with a branch to Joliette, also to build from St. Jerome to St. Eustache.

The Carolina & Yadkin River, according to report, contemplates building an extension from Denton to Troy, N. C., about 25 miles.

The city of Macon, Ga., and the Central of Georgia have signed an agreement for new $1,500,000 depot and terminal. Railway will start work as soon as it can dispose of its bonds.

The Chesapeake & Ohio contemplates the extension of its Beaver Creek branch from Beaver, Ky., to Wayland, Ky.

It is reported that surveys are being made for the construction of a logging road for the Chess & Wymond Company from Rayville to Calvert, La.

The Chicago, Milwaukee & St. Paul is reported to contemplate taking over the Crouch line running from Rapid City to Mystic, S. Dak.

The Galveston, Harrisburg & San Antonio is reported as making surveys for the extension of its line from Beeville to Fowlerton, Tex., about 70 miles.

Application has been made to the Canadian parliament for an extension of time in which to complete the James Bay & Eastern, from Lake Abitibi, easterly across the province of Quebec, passing along the south end of Lake St. John to the mouth of the Saguenay river. About 30 miles of the line from Roberval, westerly, is under contract to J. P. Mullarkey, Montreal

The Juniata & Southern, connecting with the Huntington & Broad Top Mountain Railroad at Marklesburg, Pa., has arranged to complete the remaining eight miles of the Rocky Ridge coal lands. This road is now graded and the rails should soon be in place.

The Kansas City, Ozark & Southern contemplate a 50-mile extension from Ava, Mo. August Herman, St. Louis, Mo., is president.

Financial arrangements are in progress for construction of the Kansas & Oklahoma Southern from Caney, Kan., to Vinita, Okla., via Wann and Nowata, Okla., 61 miles.

Plans are being made to build a line from Middletown, N. Y., northwest via Monticello, to Callicoon, about 40 miles. Funds have already been secured to make the surveys. The line is known as the Middletown, Monticello & Callicoon. The promoters expect to use gasoline motor cars for operating the line. Blake A. Mapledoram is engineer, Monticello, N. Y.

According to press reports the Buckhannon & Northern is making surveys for an extension from Fairmont, W. Va., southwest to Clarksburg, about 25 miles.

An American consular officer in Norway reports that a firm in his district is inviting bids for the construction of an electric mountain railway. It is stated that plans and specifications are being forwarded. When these plans and specifications arrive they may be examined at the Bureau of Foreign and Domestic Commerce and its branch offices. It is explained that an American firm recently secured a contract for the installation of a new automatic telephone exchange for an important city in that district. The consular officer states that he is in a position to supply the names of capable local representatives in the event successful bidders require such services. Correspondence may be in English.

The Ocilla Southern is reported as awarding contract for grading of an eight-mile extension from Rochelle to Pope City, Ga. It is stated that the road will later be extended to Perry by way of Hawkinsville or Unadilla. From Perry it will be extended to Macon, thence to Atlanta, by way of Forsyth, Indian Springs, Jackson and McDonough. Extensions will also be made south of Jacksonville, Fla., and a bid will be made to lease the Western & Atlantic.

According to advices from Yellowstone, Mont., a 480-foot tunnel will be driven through the mountain at Gibraltar, Mont., on Yellowstone line of Oregon Short Line.

Poe & Deveraux, Eugene, Ore., contemplate the construction of a logging railway into the timber lands on Lost Creek. The line will connect with the Natron-Oatridge branch of the Southern Pacific.

The Quanah, Acme & Pacific, which plans an extension from Roaring Springs, Tex., to Roswell, N. M., will begin construction as soon as the project can be financed.

The San Antonio, Fredericksburg & Northern will issue $361,000 of bonds for the extension north from Fredericksburg, Tex.

Porter Bros., railway contractors, Spokane, Wash., may start work this year on line up South Santiam Valley from Albany, Ore., to open up large bodies of timber land owned by them. Surveys were made by them two years ago.

The Southern Central Pacific has applied to the Canadian parliament for an extension of time in which to build from Vancouver, B. C., via Kootenay pass and the Old Man river to Hudson Bay, at a point not less than 100 miles north of Fort Churchill, with branch lines from the Blindman river, Sask., via Dunvegan to the Pacific coast at Gardner's canal, and from the Elk River, B. C., to the international boundary at Milk river.

The Southern New England has petitioned the state legislature of Rhode Island for an extension of time, to July, 1917, in which to complete work on the section in Rhode Island. This company was organized by the Grand Trunk and started work in 1912 on the line from Palmer, Mass., southeast via Blackstone and Woonsocket, R. I., to Providence, about 75 miles.

The Tavares & Gulf has been extended from Winter Garden, Fla., to Ocoee, and the company now operates a main line from Tavares south to Waits Junction, thence east via Winter Garden to Ocoee.

The Tidewater Securities Company, Mobile, Ala., is preparing to proceed with the construction of rail and ocean terminals at Dauphin Island. About nine miles of railway construction is involved.

New Local Stations on Southern Railways

The Latest Examples of Architecture on Two Well Equipped Railways for Local Station Buildings

Cincinnati, New Orleans and Texas Pacific

This company has completed within the past year several new local stations on its line which embody some of the latest features of station construction besides following out an attractive scheme of architecture. The illustrations of the two stations shown are located on the main line in the state of Kentucky at Somerset and Dry Ridge respectively.

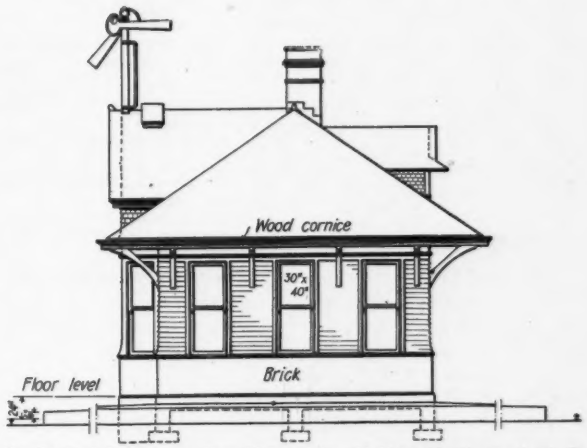
The Somerset station is one of the largest local stations, the town being the county seat of Pulaski County and the headquarters of the Ferguson shops, the main shops of the railway. This point is also the turning point of train crews. The station is built on a concrete foundation, a superstructure of vitrified brick building with concrete trimmings, tile roof, the latest improved sanitary plumbing. The platforms are of vitrified brick. The cost of this station complete was in the neighborhood of $40,000.

Dry Ridge station is a smaller type and has an even later feature in its construction, the asbestos shingle roof. The foundations are of concrete, superstructure of building vitrified brick as high up as the window sills, and above this weather boarding. The platforms are of vitrified brick. This station is used jointly by the C. N. O. & T. P. Ry. and the Cincinnati, Louisville, Lexington and Maysville Traction Company. It is interesting to note the interchange agreement and the connection tracks between the steam railway and traction companies.

We are indebted to Curtis Dougherty, chief engineer, and Adam Ritter, architect, for the information concerning these stations.

The El Paso and Southwestern

This company is noted for its permanent way and structures among the railways in the far Southwest. One of their recent station installations is at Tucson, Arizona. The illustrations depict this clearly. The whole scheme is typical of a semi-tropical country, with the characteristic flowers and shrubs in the station parkway. An unusual feature is the carrying out of the same aesthetic architectural scheme in the freight house building as is used in the passenger station. The small building shown on the right in the large illustration is the old freight house and thus the stride in architectural improvement is self evident.



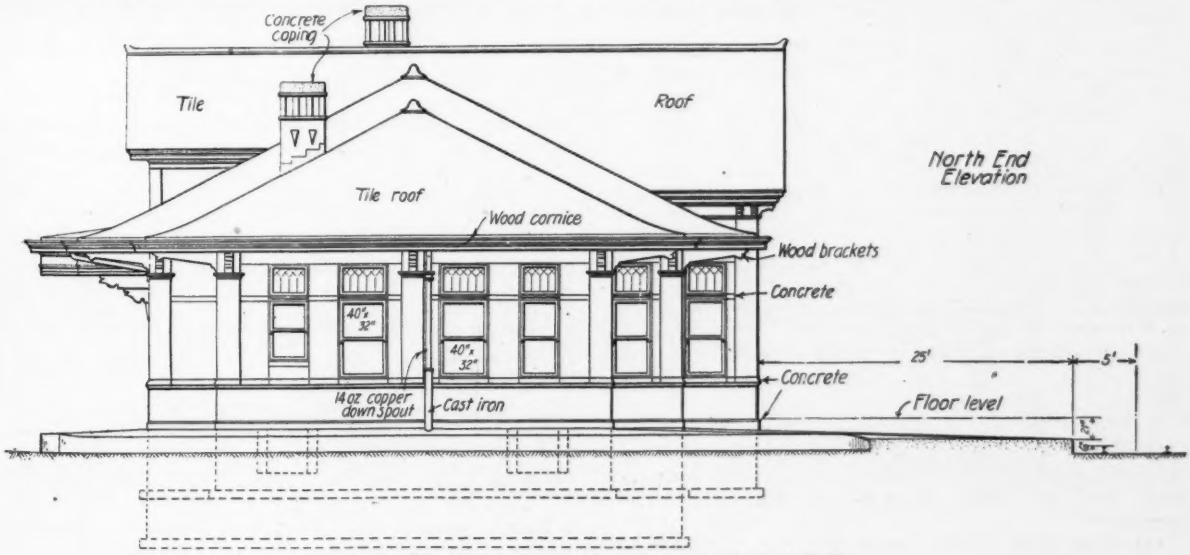
North End Elevation, Dry Ridge, Ky., Station, C. N. O. & T. P.

The buildings were designed and constructed under the direction and supervision of the office of engineer maintenance of way.

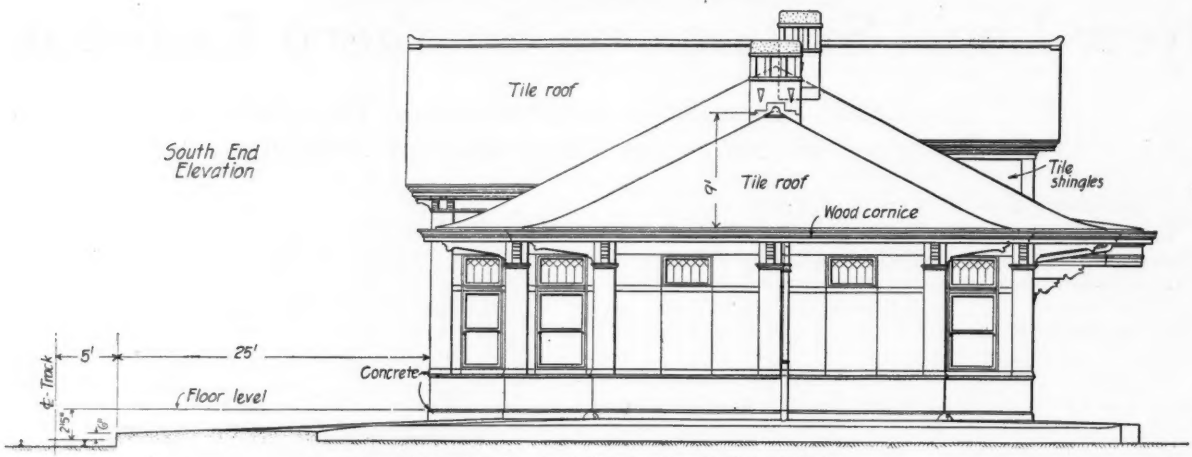
We are indebted to J. L. Campbell, engineer maintenance of way, for this information.

Announcement is made that the Milwaukee will open 200 miles of electric railroad about Nov. 1. This is the first practical test of electrical operation of a transcontinental railroad. In the East trains running into terminals are operated by electricity for short distances.

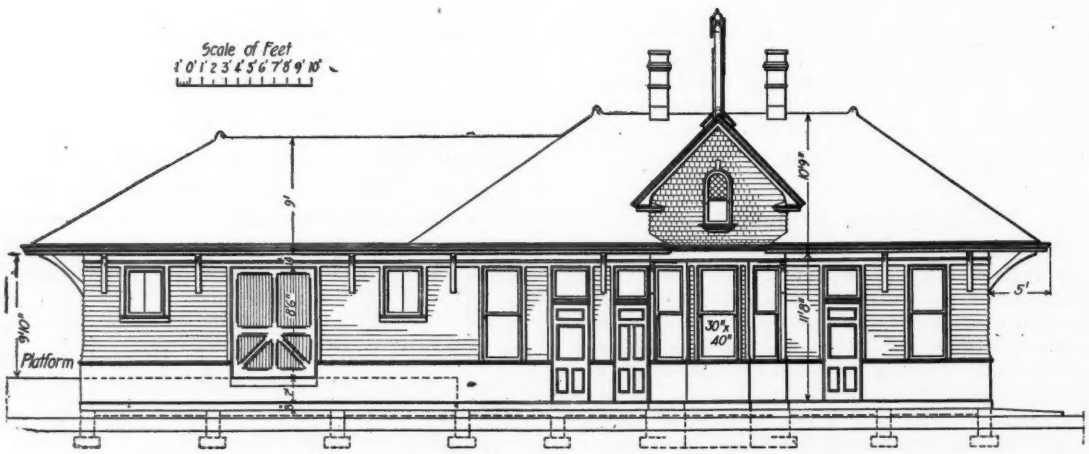
The Chicago & Eastern Illinois Railroad again has obtained for a four-year period the contract for fast mail service between Chicago and St. Louis. The 290 miles had been covered in seven hours, but the time is now cut to six hours and thirty minutes.



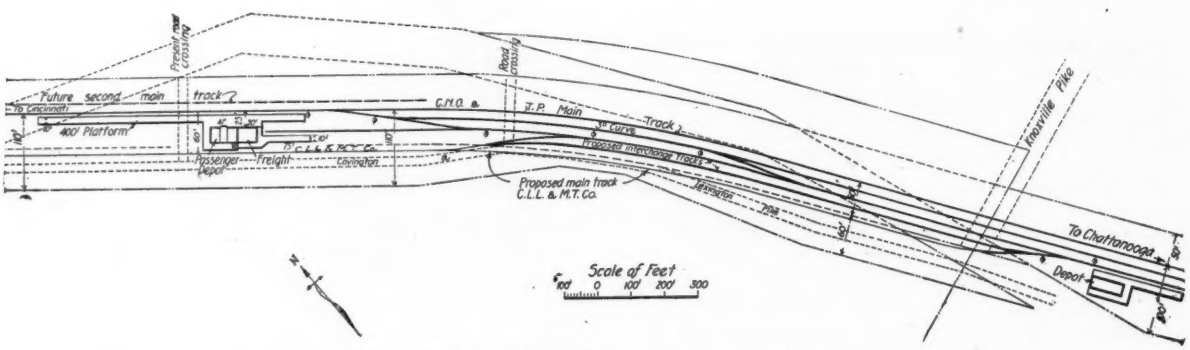
North Elevation, Somerset, Ky., Station, C. N. O. & T. P.



South Elevation, Somerset, Ky., Station, C. N. O. & T. P.



Front Elevation, Dry Ridge, Ky., Station, C. N. O. & T. P.

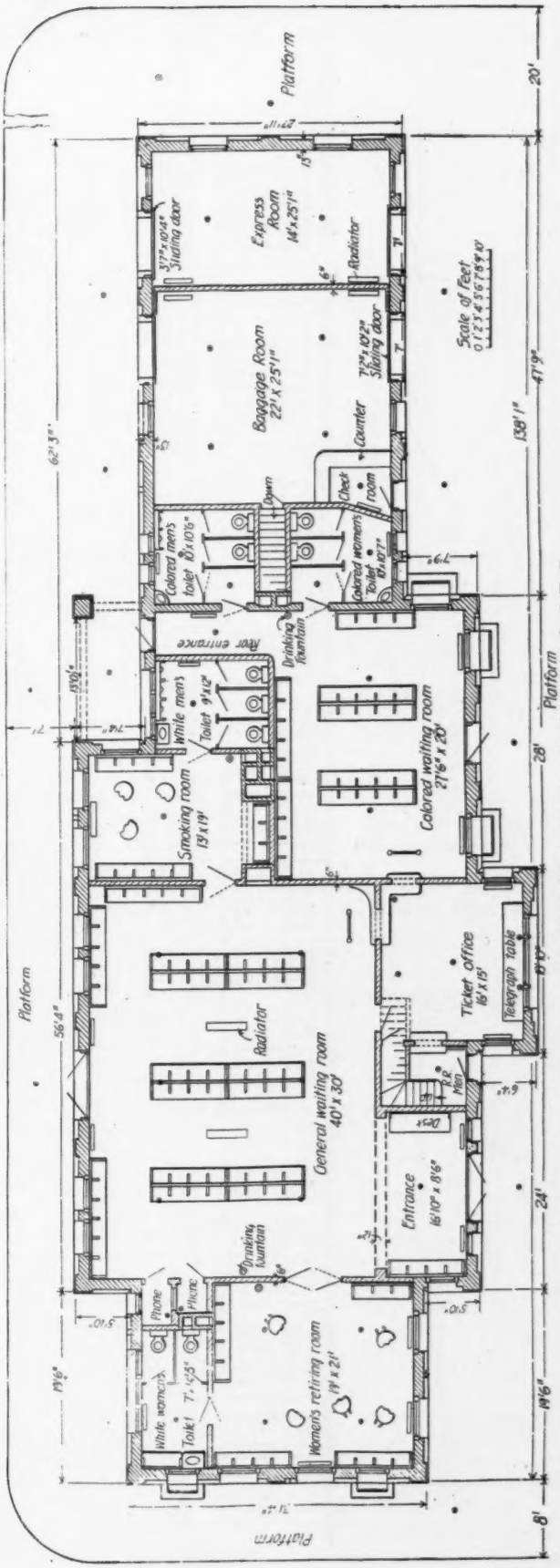


Plan of Tracks, Dry Ridge, Ky., Station, C. N. O. & T. P.

N. W. Elevation Dry Ridge, Ky., C. N. O. T. P.

N. E. Elevation, Dry Ridge, Ky., C. N. O. & T. P.

S. E. Elevation, Dry Ridge, Ky., C. N. O. & T. P.



Floor Plan, Somerset, Ky., Station, C. N. O. & T. P.

Concrete Pile Contracts.

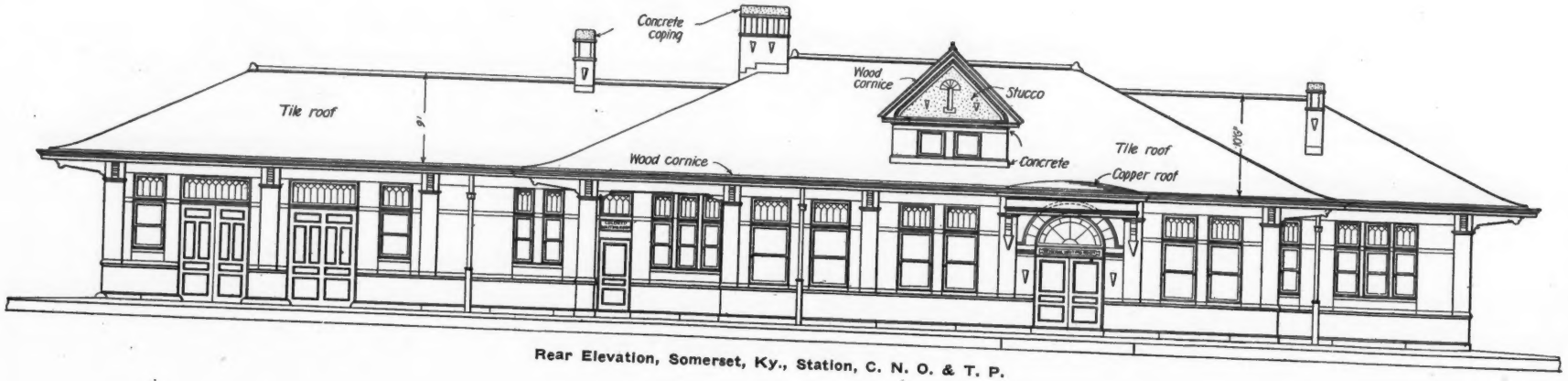
Among the recent contracts awarded the Raymond Concrete Pile Co. of New York and Chicago are the following:

Concrete piles for the building for the Brett Lithographic Co., Long Island City, N. Y. Wm. Higginson, architect. American Concrete Steel Co., general contractor.

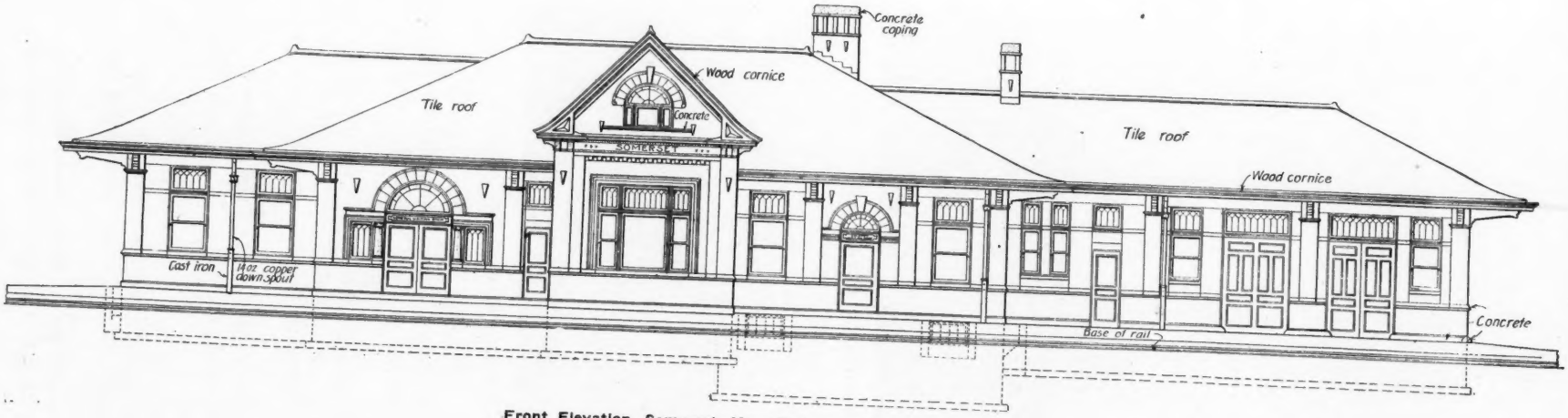
Concrete piles for the foundation of power plant for the City Hospital, Cleveland, O. J. H. Wells, general contractor.

Concrete piles for apartment building on Delaware place and Seneca street, Chicago, Ill. Wm. Ernest Walker, architect. McLennan Construction Co., general contractors.

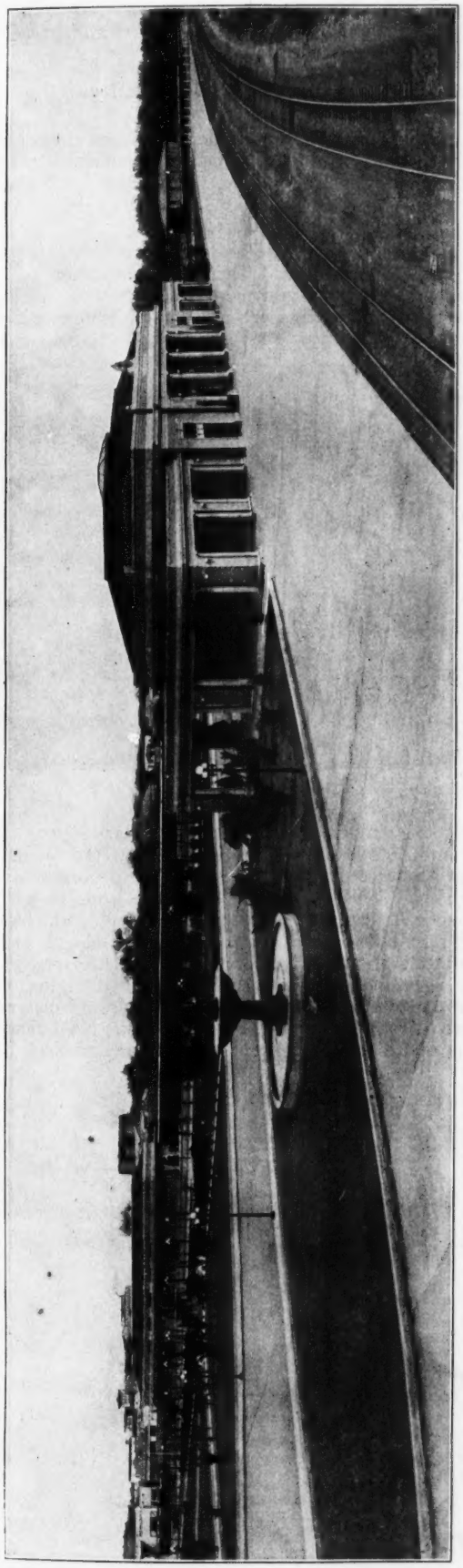
Concrete piles for the foundation of the Nurses' Home of the Methodist Episcopal Hospital, Brooklyn, N. Y.



Rear Elevation, Somerset, Ky., Station, C. N. O. & T. P.



Front Elevation, Somerset, Ky., Station, C. N. O. & T. P.



Passenger and Freight Stations, El Paso & Southwestern, Tucson, Ariz.

RAILWAY STRUCTURES

The Atchison, Topeka & Santa Fe is preparing plans for the construction of yards and the building of a new depot at Kiowa, Kan.

The Atlantic City will soon start erection of $1,000,000 station at Kaighn's Point to replace depot and ferry house recently destroyed by fire.

The Baltimore & Ohio has awarded a contract to the American Bridge Company for 2,200 tons of steel for the bridge over the Ohio river at Parkersburg, W. Va.

The new terminal system in South Brooklyn, N. Y., the Brooklyn Marginal R. R. included, will cost about $11,000,000, not including property damages.

The Burrard Inlet & Bridge Company, Vancouver, B. C., has awarded the contract for the construction of the Second narrows bridge over the Burrard Inlet to C. A. Turner and the Western Foundation Company.

A. B. Maupin, city engineer, will advertise for bids soon for two overhead bridges over the Baltimore & Ohio and the Chesapeake & Ohio at Huntington, W. Va.

The Chesapeake & Ohio has ordered 225 tons of steel from the Phoenix Bridge Company for a bridge over the Big Sandy river.

The Chicago, Rock Island & Pacific has received bids for substructure alterations on its bridge over the Canadian river in Oklahoma.

The Chicago, Rock Island & Pacific is contemplating the construction of a two-stall engine house at Magnum, Okla.

The work of wrecking and clearing away the buildings on the site of the proposed new union station at Chicago is to be begun within a few days.

The East Broad Top Railroad & Coal Company contemplates remodeling or reconstruction of its facilities at Mt. Union, Pa., for the purpose of transferring coal from narrow gauge to standard gauge cars after screening.

A contract has been awarded to the MacArthur Concrete Pile & Construction Company, 11 Pine street, New York, N. Y., for the concrete pile foundation of the bridge to be built over the St. John river between Van Buren, Me., and St. Leonard, N. B.

F. H. Hyde, of New York, awarded construction of shops at Pen Argyl, Pa., for the Lehigh & New England. Estimated cost of improvements, $100,000.

The Long Island will erect immediately a 9-story, 70x430-foot terminal market on plot bounded by Hunters Point avenue, Fourth, Oliver and Hayward streets. Estimated cost, $1,000,000.

The Missouri Pacific has decided to construct at once a viaduct at Chouteau avenue, St. Louis, Mo., to cost about $315,000.

The Oregon Short Line plans a six-stall addition to its roundhouse in Montpelier, Idaho.

In accordance with an ordinance recently adopted by the city council of Camden, N. J., the Pennsylvania plans to build a new reinforced concrete bridge over its tracks at Twenty-seventh street.

The Philadelphia & Camden Bridge & Terminal Company has been incorporated with authorized capital stock of $125,000. The purpose of the company is to construct a bridge over the Delaware river between Camden and Philadelphia. The company's offices are at 304 Market street, Camden, N. J.

The San Pedro, Los Angeles & Salt Lake has applied to the city of Los Angeles, Cal., for permission to erect a 2-story, 162x90-foot, reinforced concrete station on the east bank of the Los Angeles river south of Seventh street. Estimated cost, $260,000.

L. D. Smoot, commissioner of public works, is preparing plans for proposed viaduct to connect Park and Bay streets in Riverside on the Seaboard Air Line in Jacksonville, Fla.

Plans are being prepared for a bridge to be constructed in connection with 34-mile railroad to be built between Fayetteville, Tenn., and Huntsville, Ala., by the Tennessee & Alabama Railroad Company.

The Iowa Central Black Hawk Chute Bridge

A Plate Girder Bridge Over the Minor Channel of the Mississippi River at Keithsburg, Ill. This Bridge Replaces an Old Structure, the Construction Using Old Piers as Well as New

At Keithsburg, Illinois, the Mississippi River has two distinct channels, the minor channel being termed the Black Hawk Chute. The bridge under consideration was built at the same time and in conjunction with a bridge over the main channel, both of these bridges replacing old structures which were too light to accommodate the present heavy traffic.

General Design.

The bridge over the Black Hawk Chute consists of 22 deck plate girder spans 67 feet 11 inches out to out, giving a total length of structure of about 1,501 feet. The old structure consisted of four light steel truss spans each about 205 feet center to center of piers, with timber trestle approaches; these spans were supported on masonry piers resting on piles. The center line of the new bridge coincides with that of the old one and it was therefore possible to utilize these old piers in the new structure. This was done by making the span length of the new girders ⅓ of that of the old truss spans, thus adding two new piers between each pair of old ones. The tops of the old piers were not at the proper elevation to receive the new girder spans and they were accordingly cut down several feet and refinished to the proper elevation with concrete, and at the same time, repointed.

Fig. 1. Plate Girder Bridge over Black Hawk Chute, Iowa Central Ry.

Pier Construction.

As previously stated, the bridge consists of 22 equal deck plate girder spans. These are supported on 5 remodeled old piers, 16 new piers, and 2 abutments. The new piers and abutments are of concrete, supported on timber piles. The pier shafts are 6 ft. 1 in. wide by 16 ft. long under coping, the ends being semi-circular, and both sides and ends being battered one-half inch per foot vertically. The shafts are protected with ⅜ inch steel shell. The bases are 14 ft. wide by 23 ft. long by 14 ft. deep, and are supported on piles which are cut off 6 ft. below top of base. The top of base is practically at elevation of river bottom. The bases rest in a rather fine sand and were sunk by open dredging. A timber crib was towed to the site, loaded, and material excavated from the inside as crib was sunk. No difficulty encountered in general except through encountering old

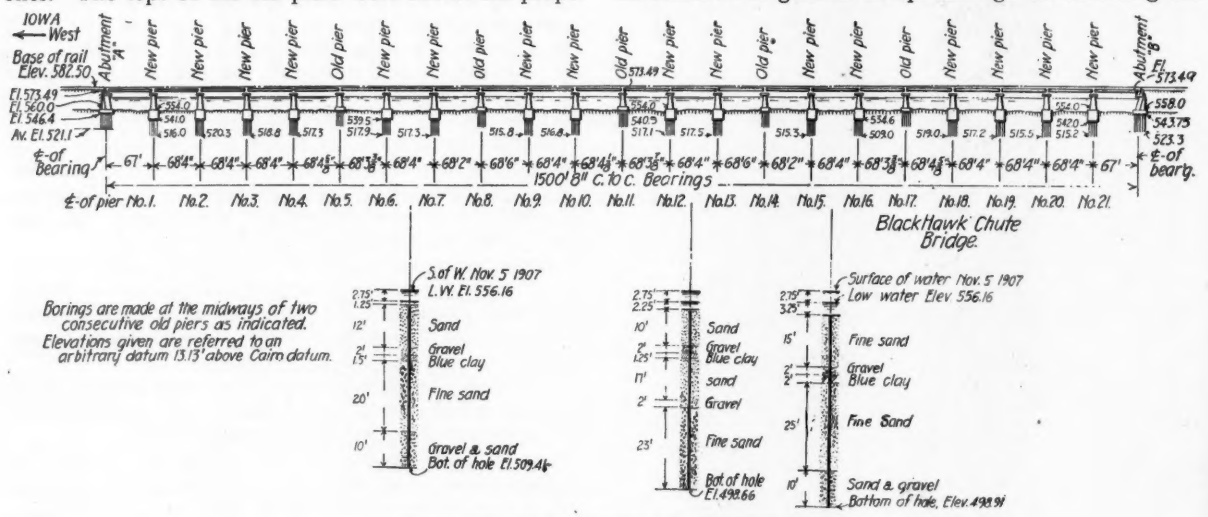


Fig. 2. Elevation of Bridge and Soil Survey.

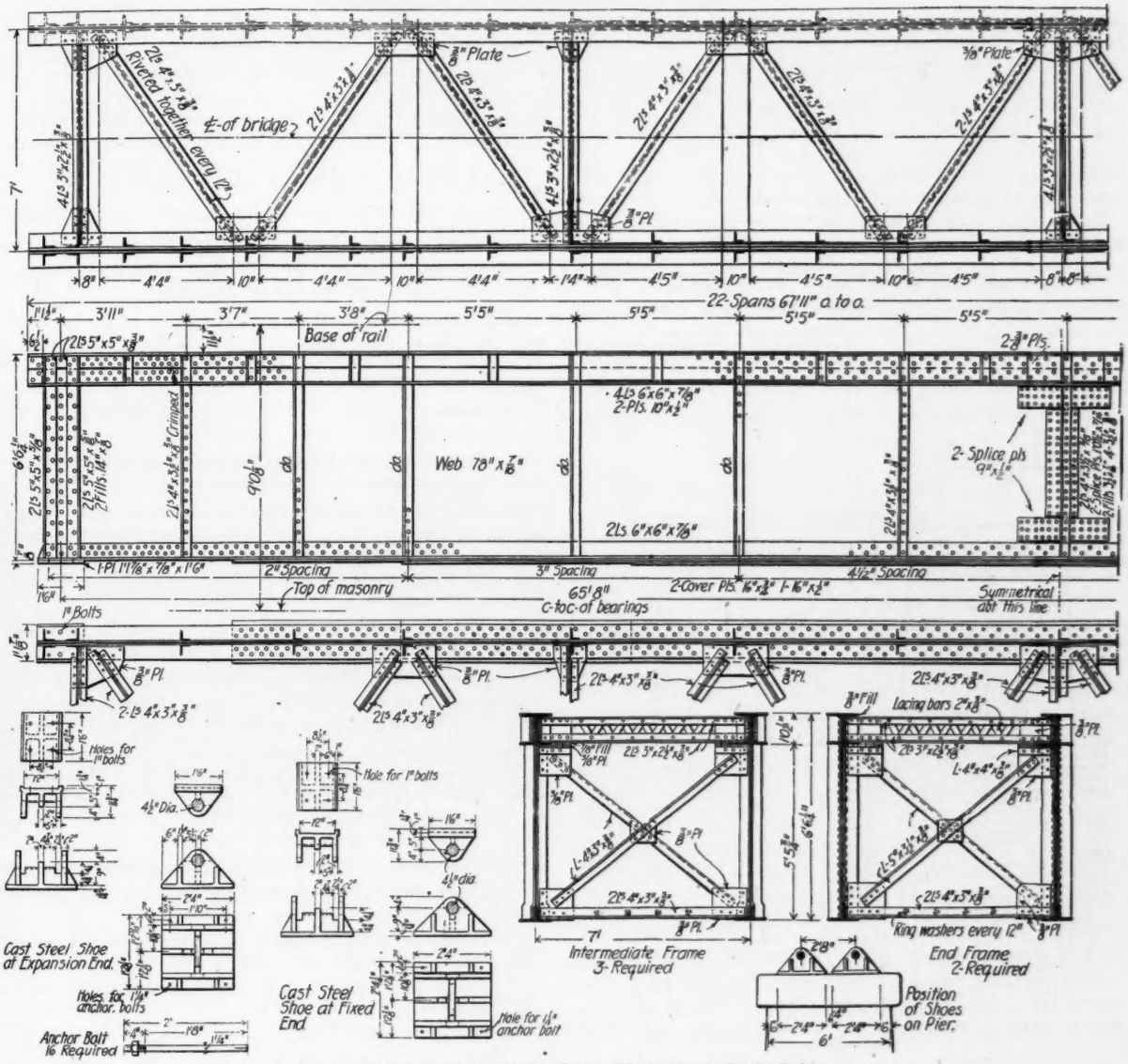

22-Spans 67'11" c. to c.
Base of rail
Web 78" x 7/16"
2-Splice pls
Top of masonry
65'8" C-to-C of bearings
Symmetrical abt this line
Intermediate Frame 3-Required
End Frame 2-Required
Position of Shoes on Pier
Cast Steel Shoe at Expansion End
Cast Steel Shoe at Fixed End
Anchor Bolt 16 Required

Fig. 3. Details of Plate Girder Spans Black Hawk Chute Bridge.

logs and stub ends of piles from an old timber trestle which had been at the site for many years. After sinking the crib, the piles were driven—in general about 35 to 40 ft. below river bottom. Piles went first through sand, then through a bed of clay about 5 ft. thick, then through more sand to a firm bearing in gravel. After piles were driven, the bases were filled with concrete under water with a tremie to an elevation just below cutoff of piles. A small cofferdam of construction similar to the crib had been built on crib as it was being sunk. After the base was filled to point above stated, the pier was unwatered, the piles cut off, and balance of concrete placed in the dry. The maximum pumping required was about eight feet, the work being done at a low stage of the river.

Abutments.

The abutments are the ordinary type of railroad abutment, resting on piles, with sloped wingwalls at an angle of 30° with face of abutments. Abutments were put in with the use of Wakefield sheet piling and, with the exception of sunken logs and drift which had to be removed, offered no difficulties.

Construction.

In building the bridge the first procedure was the driving of falsework under the old truss spans. These were driven with a pile driver mounted on a barge—a drop hammer being used in driving these as well as all other piles. The old truss spans were then dismantled with a

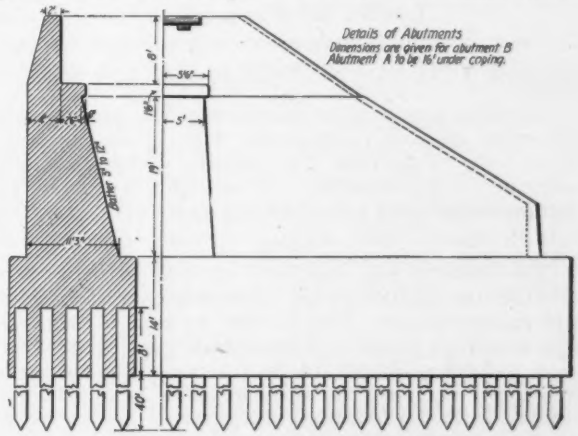


Fig. 4. Detail of Abutment.

derrick car, a temporary track being laid on the falsework as the spans were removed. To handle the substructure work a through traveler was used. This spanned the railroad track, having sufficient vertical and horizontal clearance between its supporting legs to allow trains to pass. At each bent of the timber trestle additional outside piles were driven, and a new cap laid from these piles to the old cap. Timbers spanning these new caps carried the rails for traveler track. All substructure piles were driven with a pile driver mounted on this traveler.

The deck plate girder spans were erected with a derrick car. The temporary track on falsework was removed between two successive piers, the girder span

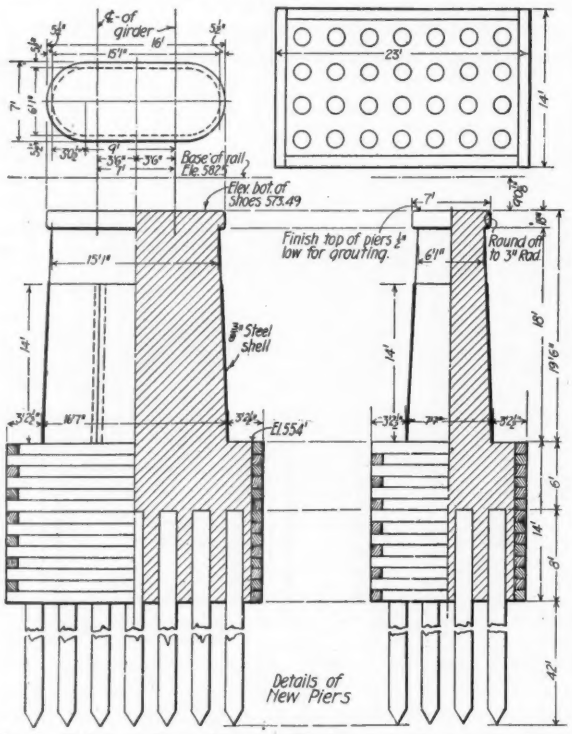

℄ of girder
Base of rail Ele. 582.5
Elev. bot. of Shoes 573.49
Finish top of piers 1" low for grouting.
Round off to 3" Rad.
3/8" Steel shell
El. 554'
Details of New Piers

Fig. 5. Detail of Piers, Showing Timber Crib Used to Facilitate Excavation.

put in place, and the track immediately relaid on the girder span.

The girder spans are of ordinary deck girder construction as shown by details in the accompanying drawing, Figure 3.

Loading and Specifications.

The structure was designed for a live load corresponding to Coopers E-55, according to Waddell's specifications.

The usual specifications for material and workmanship governed, all rivet holes except those in bracing, however, being subpunched and reamed. Concrete in piers ordinarily 1:3:5 concrete. For copings and concrete deposited under water 1:2:3 concrete was used.

Costs.

The structure was completed in 1910 and cost about $150,000.00; $90,000.00 for substructure and $60,000.00 for superstructure. This includes an item of $4,100.00 for falsework to carry railroad traffic during construction, and one of $2,400 for the removal of the old spans, the unit prices for these two items being $5.00 per lineal foot of track for falsework and $3.00 per lineal foot for the removal of the old spans.

Personnel.

The bridge was built by the Iowa Central Railway Company, and designed and the construction supervised, by Waddell & Harrington, consulting engineers, Kansas City, Missouri, Mr. M. J. Maher being resident engineer at the site. The Union Bridge and Construction Company of Kansas City, Missouri, put in the substructure and erected the superstructure. McClintic-Marshall Company, Pittsburgh, Pennsylvania, had the contract for the fabrication and delivery of the superstructure.

IRON AND STEEL

About one-half of the 25,000 steel rail order of the Baltimore & Ohio is said to have gone to the Steel Corporation's mills, and the balance to the Maryland Steel Co. and other eastern mills.

The Boston & Maine, it is said, has distributed orders for 15,000 tons of rails.

The Chicago & North Western has placed an order for 27,000 tons steel rails with the Illinois Steel Co.

An American consular officer in the Far East reports that a railway company in his district is in the market for 60-pound steel rails, with fishplates, nuts, bolts, etc. It is proposed to construct about 20 miles of roadbed. Quotations should be made c. i. f. destination.

The Chicago & Eastern Illinois is reported to have contracted for about 15,000 tons of rails with the Illinois Steel Co.

The Denver Union Terminal Railway Company has ordered 152 tons of steel for its approach to the Twenieth steet viaduct, Denver, Colo., from the Patterson Burkhardt Company.

The Erie, according to report, has ordered 35,000 tons of rails, or practically double last year's tonnage. Part of this order, 22,000 tons, it is said, was taken by the Carnegie Steel Co., 6,000 tons went to the Illinois Steel Co., and the balance to the Lackawanna Steel Co.

The New York, Chicago & St. Louis has ordered 2,500 tons of rails from the Lackawanna Steel Co. and 2,500 tons from the United States Steel Corporation.

The Southern Pacific is said to have ordered 30,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Washington, Idaho & Montana is in the market for tie plates and frogs.

The Union Pacific has ordered 10,000 tons of rails.

The Baltimore & Ohio has ordered 9,000 tons of standard steel rails from the Cambria Steel Company and 4,000 from the Maryland Steel Company.

The Chicago, Milwaukee & St. Paul has issued a scrap list containing 1,000 tons, of which 500 tons are long steel rails and 200 tons of No. 1 railroad wrought iron.

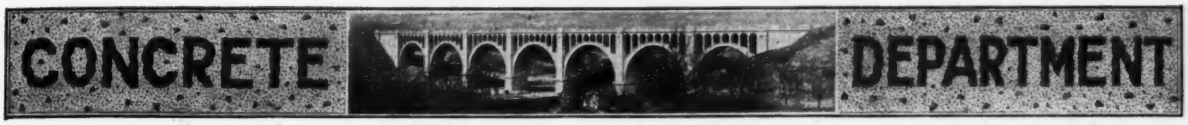
The Hocking Valley is about to place an order for 4,000 tons of rails.

Orders for rails actually placed by the New York Central lines for early 1915 delivery total 57,500 tons to date, with reservation made at the mills for May, June and July rolling of 13,500 additional tons.

The Southern has ordered 4,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Norfolk & Western will take bids February 17 on its list of iron and steel scrap accumulations for February, which total about 1,800 tons. The largest item on the list is 650 tons of car wheels. Other grades are 300 tons of long and short rails, 250 tons of cast iron, about 200 tons of wrought and the balance of miscellaneous material.

Formal distribution of 160,000 tons, the remainder of the Pennsylvania rail order, still appears some weeks distant.



Waterproofing Solid Floor Bridges

At the present time there exists a great variety of practice among the different roads as to methods of waterproofing solid floor bridges, which is quite natural in view of the unsettled status of this new field of engineering design. Very often the waterproofing of a structure has proven unsatisfactory because some small and seemingly unimportant detail was not given proper attention. The specifications for materials have been developed to such a point that uniformly good material can be obtained and from now on, more attention will be paid to application and attendant details. A recent paper, "The Waterproofing of Solid Steel-Floor Railroad Bridges," by S. T. Wagner, M. Am. Soc. C. E., Ass't Engineer P. & R. Ry., in the December, 1914, Proceedings, American Society of Civil Engineers, emphasizes this fact.

Mr. Wagner says in part: "There can be little doubt that, in all designs, the primary object should be to provide such details as will remove the water from the bridge in the quickest possible time and by the shortest route; and further, in case of the possibility of the water being held on the bridge for any considerable time after a storm, to design the height of the waterproofing so that it will be above the highest water level. There are many places where the ballast will become very dirty in time, and in such localities this detail is important. It is also considered inadvisable to throw all the water off the bridge at its ends, over back walls. It is very difficult to design at this point a satisfactory detail which will prevent water from forcing its way back over the back wall and down the face of the abutment, even though the drainage back of the abutment is specially good. It is much better to collect the water on the deck of the bridge, take it below the floor by inlets and downspouts, and discharge it below the floor on the ground, or into a sewer (if in a city). Such inlets can be made so as to be accessible from below for cleaning, and, with ordinary care, can be made satisfactory as far as leakage around them is concerned. To carry the water away quickly, there should be a number of these inlets on any bridge of considerable extent.

In the case of deck structures, the waterproofing details are simple, the principal questions to be settled being the type of waterproofing to be used and the durability of the materials. The application of the waterproofing—whatever kind may be selected—is not difficult.

In a half-through structure the conditions for waterproofing are at their worst. If the top of rail is near the top of girder, it is generally advisable to carry the waterproofing over the girder and encase its entire top in concrete.

The finish of the waterproofing against the web of a half-through girder, the top of which is 3 ft. or more above the top of rail, is one of the most difficult problems to be solved. In some cases, it is the practice to carry the waterproofing nearly if not all the way up to the top of the girder, and protect it with a considerable thickness of concrete, but, generally, it is finished up against the web not far above the level of the top of rail. This finish, if done satisfactorily, will make a good piece of work of the structure as a whole, provided the detail in respect to water running over the backwalls is guarded against. It is believed that riveting a flashing angle to the web does not provide a satisfactory detail as it is impossible to make it continuous on account of gussets and stiffeners. Placing a pocket of ductile adhesive mastic (which will not harden in cold weather) as a joint between the waterproofing layer and the web is believed to give the best results, and in case of the deterioration of this asphalt, the detail is in a place where repairs can be made without interfering with traffic. The question of interference with traffic in making waterproofing repairs is one that is giving many railroad bridge engineers serious concern, and is leading slowly but surely to much more elaborate, effective, and expensive systems in order that repairs may be postponed as long as possible."

Bridge engineers who have had occasion to make repairs on leaky concrete or steel floors of bridges can readily appreciate the correctness of this last statement of Mr. Wagner's. On concrete bridge work and in concrete floors for steel bridges the concrete itself is practically permanent, but based on our present knowledge of the subject, the waterproofing possesses a comparatively short life and our designs must be made primarily to facilitate easy renewal. On many bridges no doubt insufficient attention has been given the matter of quick removal of water and unsatisfactory results have been obtained. A few extra dollars spent for an adequate system of drainage at the time of building the bridge will save many dollars in maintenance during the life of the structure, and the extra expenditure is therefore warranted.

Hooped Reinforcement for Concrete Columns

The so-called reinforced concrete column reinforced with vertical bars without hoops or ties at intervals to prevent the tendency of the bars to buckle has long been the target of much just criticism. The disastrous fire at Thomas A. Edison's plant at West Orange, N. J., which occurred on Dec. 9, 1914, has demonstrated conclusively that columns without hoops or ties are not fireproof.

The heat of the fire in two of the concrete buildings was very intense on account of the great amount of highly inflammable material stored in them, and because of this fact the bars (one in each corner of the column) were unduly heated and naturally expanded, forcing off

the protecting shell of concrete. It was interesting to observe how some of the columns behaved when subjected to action of fire and water. On inspection it could readily be seen that the concrete alone carried the imposed load after the rods buckled. In cases where the heated columns were touched by water from the fire hose, they spalled and buckled badly and in several instances shearing failures took place on account of the core not being properly tied together, and the inability of the reduced section of the concrete to bear the load. Aside from this, the reinforced concrete buildings clearly demonstrated their worth. After this forceful lesson of the folly of rodded columns, any owner, contractor, architect or engineer who allows columns of this type to enter into the construction of a fireproof building should be considered criminally negligent. No column of any structure should be built without horizontal ties or what is better spiral hooping at fairly close spacing. That steel so placed greatly increases the strength of a column has been demonstrated in many laboratory tests and we very much doubt that failure would have occurred in the Edison building columns had hoops or spirals been used. Spiraled columns have not been used to any great extent in railroad structures, but their use is increasing and the engineer should safeguard his structures by their use wherever the dangers of fire are to be encountered.

Hydrated Lime in Concrete

Descriptive of the Results Secured by the Use of Hydrated Lime in Concrete.

In a great many parts of the United States at the present time, hydrated lime has become very favorably recognized and in considerable demand as a suitable product for mixing with concrete to make it dense, and thereby rendering it more waterproof. The addition of small percentages of hydrated lime, when making concrete mixtures, is immediately effective in promoting plasticity throughout the mass, thereby rendering the concrete more homogeneous and keeping it so during transit, before placing. After placing concrete which contains hydrated lime, its subsequent spading in the forms is greatly facilitated, and the thorough covering of all steel reinforcing rods is more perfectly accomplished. In fact, concrete mixed with a small percentage of hydrated lime seems to almost automatically fall into place.

The proportion of plasticity and homogeneity, which small percentages of hydrated lime give to concrete, cannot be secured in any other way at so little added expense for the material used. On many large reinforced concrete buildings which are being constructed in the United States today, the concrete is mixed at one or two central mixing plants, which are generally located on the ground or in the basement of the building. After mixing, it is dumped into carriages and elevated, then distributed through galvanized iron pipes or chutes to the various parts of the building. It is a well-known fact that Portland cement, when mixed with water, is not very plastic, some brands of cement being extremely non-plastic, and while the mixture for reinforced building construction is a rich one (generally 1-2-4), yet even so, it is sometimes very difficult to secure sufficient plasticity in the concrete to insure its being elevated, poured and distributed without considerable sticking and clogging of the pipes, attendant with more or less separation of the aggregate.

* *Abstract from Paper by Robert S. Edwards, Consulting and Chemical Engineer, Portland, Oregon, in the Los Angeles Builder & Contractor.*

The use of hydrated lime as a void filler in concrete mixtures, and for rendering concrete mixtures more water-tight, dates back several years. Numerous tests show that a replacement of from ten to fifteen per cent of cement by hydrated lime in rich mixtures does not decrease the compressive strength of the concrete after three to four months' time, and ultimately increases the strength and permanence of the concrete. It apparently makes but little difference as to its action as a void filler, whether the hydrate is manufactured from a dolomitic or high magnesium lime or a high calcium lime—it being necessary only to have a product which contains no free lime or unslacked particles. The proper hydration or dry slacking of lime reduces it to a finer degree of sub-division than can be accomplished by any mechanical means.

The amount of water required to convert the dry hydrated lime into a plastic paste varies from fifty to seventy per cent of the weight of the lime, while to obtain a mortar of similar consistency with Portland cement, an addition of twenty-five to thirty per cent of water is required.

Unlike Portland cement, however, the addition of water to hydrated lime does not create any chemical reactions; simply a lime paste is formed which holds its excess water for a long time. Upon the addition of small quantities of hydrated lime, amounting to ten or fifteen per cent to the weight of cement used in concrete mixtures and the ordinary mixing of such mixtures, the hydrate, which has absorbed a large amount of water, corresponding to its weight, is thoroughly disseminated throughout the concrete mass, and due to its fine plastic condition, it is forced immediately into places in the concrete which the cement cannot reach.

Concrete, so mixed, on leaving the mixer flows more readily into place and the coarse aggregate has much less tendency towards segregation in the concrete mass. In other words, the extreme finely divided condition of the moistened hydrated lime paste has increased, to a marked degree, the covering or spreading quality of the cement, and reduced, to a similar marked degree, the friction between particles of fine coarse aggregate.

This answers the question of "why hydrated lime benefits concrete"—the action is purely a mechanical one, and can be compared to the oiling or greasing of a shaft or bearing. The property which hydrated lime has of absorbing and retaining large percentages of water, offers a ready solution to the problem of finding a means for keeping and holding moisture in freshly poured concrete until the slower acting cement hardening process can utilize it.

From a study of the foregoing data it is perfectly obvious that small percentages of hydrated lime, when added to concrete mixtures in road work, will accomplish the following things:

1. Rendering of the concrete highly plastic and homogeneous, thus producing density and uniformity in the finished concrete. This condition adds much to the life and efficiency of the road, because of the uniform resistance to wear and other stresses.
2. Keeping a certain amount of excess moisture in the concrete while setting.
3. Rendering the concrete mass more nearly water-tight and thereby preventing the alternate wetting and drying out of the finished concrete.
4. In large pieces of work, the above properties given to concrete by hydrated lime would materially reduce the labor in spreading and bringing the concrete to a uniform surface, which is of great importance in paving work.

HIGHER CEMENT RATES

Higher rates proposed by the Northern Pacific and Chicago, Milwaukee & St. Paul Railway companies on mixed carloads of cement, lime, stucco, plaster, roofing pitch and salt from St. Paul, Minneapolis, Duluth, Superior, Wis., and other points to points in North Dakota and Montana were approved today by the Interstate Commerce Commission.

Glenmoore Bridge, Philadelphia & Reading

A Four Track Concrete Arch Bridge Built in Two Longitudinal Sections in Order to Maintain Traffic on Old Steel Structure During Construction

By A. M. Wolf, C. E.

In keeping with its policy to replace steel bridges by permanent ones of concrete, wherever the conditions permit, the Philadelphia & Reading Railway has recently replaced the old deck truss bridge over Stony Brook just east of Glenmoore, N. J., on the New York Division, by a modern four-track concrete arch bridge.

The old double-track deck truss bridge consisted of four 100-foot truss spans and two short 25-foot approach spans, one at either end. The new structure consisting of three 50-foot three-centered arches on an 11-degree skew, one 53 ft. 3 in. plate girder span over trolley tracks at south end of bridge replaces the south end of the old bridge, the remainder being replaced by an earth fill, because experience showed that as great a waterway as was originally provided was not necessary, the creek not being of the torrential variety. The new bridge was built in two longitudinal sections so as to allow the maintenance of traffic on the old structure until one section had been completed, when the tracks were shifted, the old trusses dismantled and the remainder of the new work completed. The first unit built, was 23 feet 6 inches wide, and the second 49 feet 6 inches, making a total width of 73 feet for the finished structure. This feature of the construction is of interest because of the growing tendency to replace bridges without realignment and if the concrete structure is wider than the old steel bridge this can be very readily done with little additional expense without any delay to traffic.

Fig. 1. Concrete Arch Bridge Over Stony Creek, Glenmore, N. J., Philadelphia & Reading.

The reinforced concrete arches are of the filled spandrel type resting on plain concrete piers and abutments carried down to solid rock a few feet below the bed of the stream. The location of a road and trolley track under the bridge close to the south bank of the creek and the fact that traffic on same could not be interfered with, made necessary the use of a plate girder span over road. This span has a solid reinforced concrete ballasted floor. (See Fig. 2.) At the present time only two tracks are laid across the bridge 6 feet 6 inches on each side of center line, the future tracks to be laid 13 feet to each side of the present. When these tracks are put in two additional sets of plate girders will have to be installed since this portion of the bridge is fitted to meet the present requirements only.

DETAILS OF DESIGN.

Loading and Unit Tresses—The arches were designed for a live load of 1,000 pounds per square feet, and the dead load of concrete at 140 pounds per cubic foot and ballast at 120 pounds per cubic foot. The arch rings were proportioned for dead load and the most unfavorable condition of live loading so as to keep the ring entirely in compression at a maximum of 400 pounds per square inch, the reinforcement being added to provide for stresses due to temperature and rib shortening. The plate girder span was designed for Coopers E-55, with impact in accordance with the A. R. E. A. formula $I = S\frac{300}{L+300}$. The unit stresses used for concrete floor being 15,000 pounds tension in reinforcing steel and 700 pounds per square inch compression in crossbending in concrete.

For the arch rings, bridge seats, back walls, copings and girder span floor a 1:2:4 mixture was used, and a 1:3:6 mixture in all other parts of the structure.

Piers—The piers are of plain concrete carried down to solid rock a few feet below bed of creek. They are 7 feet wide and 82 feet 8¾ inches long overall, with vertical sides and a 45-degree cut-water 3 feet 6 inches long beyond face of spandrel at each end. The pier footings are 6 feet deep with a projection of 1 foot beyond the neatwork. The sides and ends of piers are scored with V-shaped horizontal coursing joints about 1 foot centers.

Abutments—The north abutment is of the ordinary splayed wing type with a thickness of 10 feet 6 inches at the springing line and 10 feet 9 inches at the top of footing, which projects 1 foot beyond neat-work. The wings have a face matter of ½ inch per foot, a top width of 2 feet and stepped backs with 13-inch horizontal offsets for each 4 feet vertically.

The south abutment of the arches serves also as an abutment for support of the plate girder spans over the roadway. This abutment is of trapezoidal shape as shown in Fig. 2; 19 feet thick at springing line of arches, measured at center line of track. Above the haunch of arch the support for girders is carried up as an ordinary abutment. (See Sec. D.-D., Fig. 3.) The south end abutment for girder span is of the same type as the north abutment, with one straight and one splayed wing and a width of 9 feet, just above the footing, as shown in detail in Fig. 2.

Arches—The arches which are reinforced longitudinally and also have some transverse reinforcement, were designed as plain concrete arches by the static method. The arches with a 50-foot clear span measured on the skew are three-centered with a rise

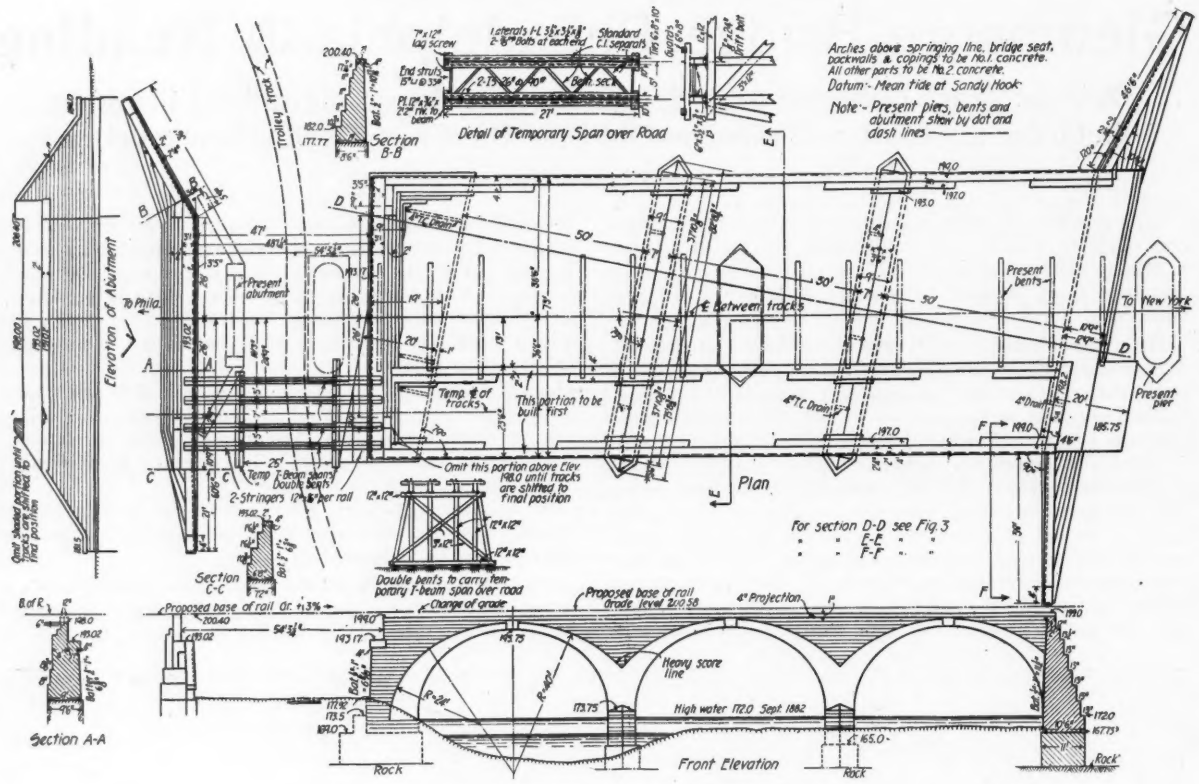

Detail of Temporary Span over Road
Section B-B
Archies above springing line, bridge seat, backwalls & copings to be No.1 concrete. All other parts to be No.2 concrete.
Datum:- Mean tide at Sandy Hook.
Note:- Present piers, bents and abutment show by dot and dash lines
Elevation of Abutment
Plan
Present abutment
Present bents
Present pier
To Phila.
To New York
Between tracks
Temp. C. of tracks
This portion to be built first
Omit this portion above Elev 198.0 until tracks are shifted to final position
Temp. I-Beam Spans Double Tracks
2-Stringers 12" I-beams per rail
Double bents to carry temporary I-beam span over road
for section D-D see Fig. 3
" " E-E " "
" " F-F " "
Section C-C
Section A-A
Proposed base of rail Gr. +1.3%
Change of grade
Proposed base of rail Grade level 2.0.58
4" Projection
Heavy score line
High water 172.0 Sept. 1882
Front Elevation
Rock

Fig. 2. General Plan and Elevation, Glenmoore Bridge.

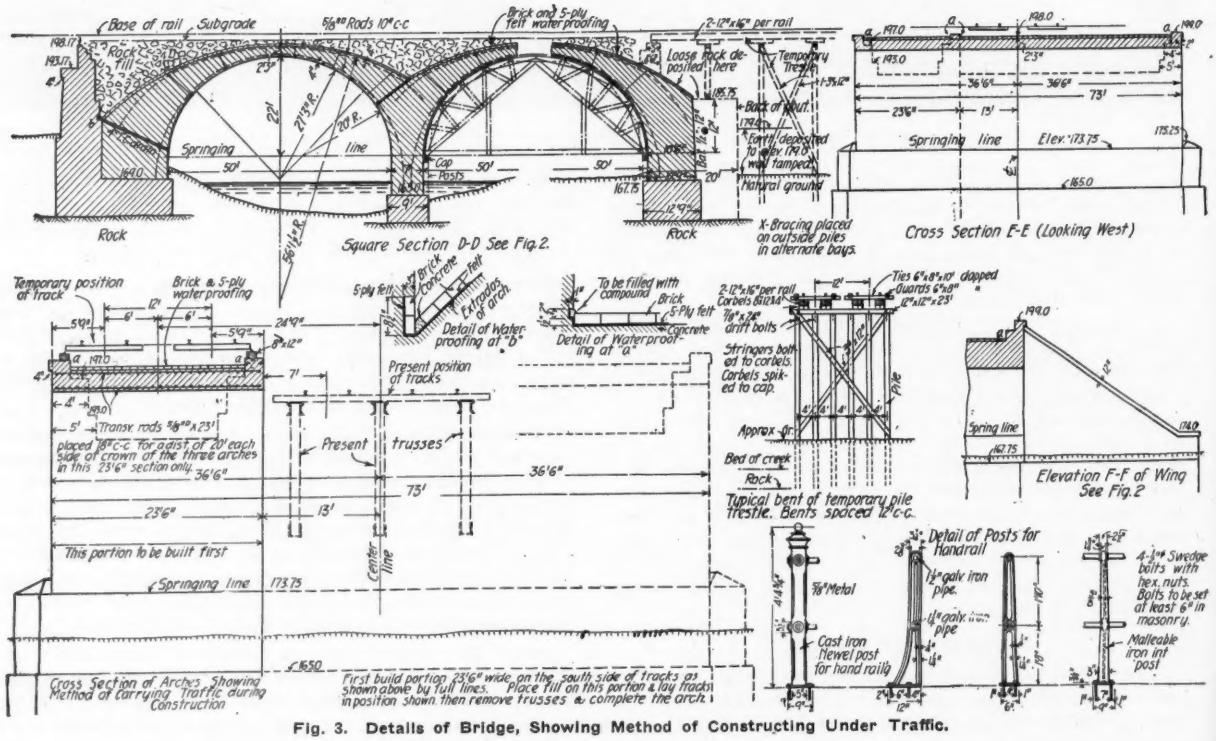

Base of rail
Subgrade
Rock
Fill
Springing line
Brick and 5-ply felt waterproofing
Loose Rock deposited here
Temporary Trestle
Back of abut.
Earth deposited to elev. 179.0 well tamped.
Natural ground
Square Section D-D See Fig. 2.
X-Bracing placed on outside piles in alternate bays.
Cross Section E-E (Looking West)
Elevation F-F of Wing See Fig. 2
Temporary position of track
Brick & 5-ply waterproofing
Detail of Waterproofing at "b"
Detail of Waterproofing at "a"
Present position of tracks
Present trusses
Transv. rods
This portion to be built first
Center line
Cross Section of Arches Showing Method of Carrying Traffic during Construction
Typical bent of temporary pile trestle. Bents spaced 12' c-c.
Stringers bolted to corbels. Corbels spiked to cap.
Bed of creek
Detail of Posts for Handrail
Cast iron Newel post for hand rail
Malleable iron int. post
First build portion 23'6" wide, on the south side of tracks as shown above by full lines. Place fill on this portion & lay tracks in position shown, then remove trusses & complete the arch.

Fig. 3. Details of Bridge, Showing Method of Constructing Under Traffic.

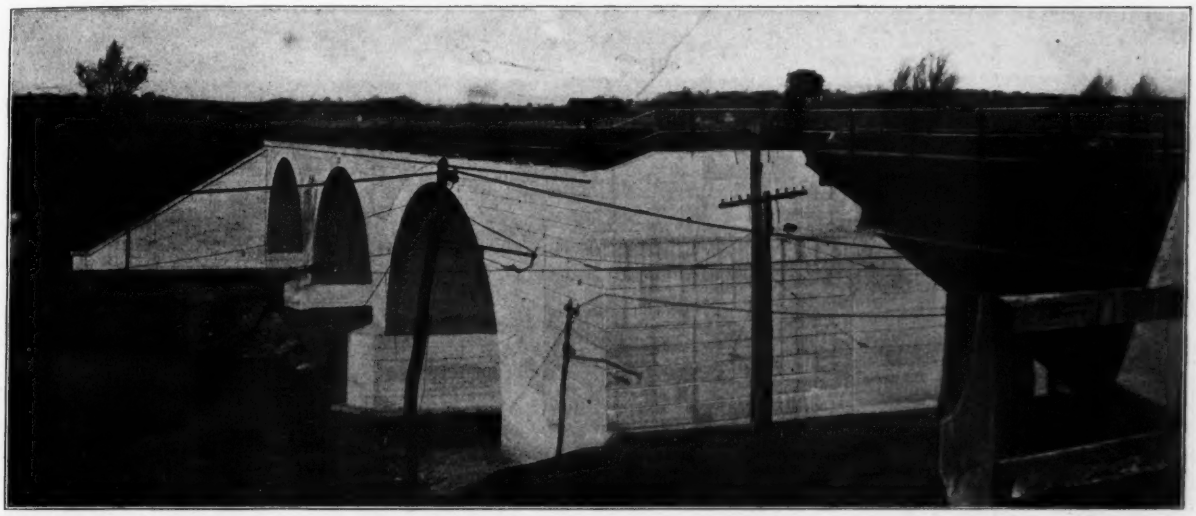


Fig. 4. West Elevation of Glenmoore Bridge, Showing Plate Girder at South End.

of 22 feet and a crown thickness of 2 feet 3 inches. The longitudinal reinforcement consists of ⅝ inch square bars, 10-inch centers near extrados and intrados lapped 2 feet 6 inches at splices. The intradosal bars are carried down into the pier to the top of footing. Transverse bars, ⅝ inch square, 1 foot 6 inch cts., for a distance of 20 feet each side of crown, were used only in the 23-foot 6-inch section on east side of bridge, which was built complete with spandrel walls to carry the tracks temporarily while remainder of bridge was built. (See Fig. 3.)

The spandrel walls are of a gravity section 2 feet 4 inches wide under coping which projects 4 inches beyond face of wall. The coping is surmounted by a gas-pipe handrail carried by cast iron posts of special design spaced about 8-feet 5-inches centers, with heavy cast iron newels at ends of arch and plate girder portion as shown in Fig. 4. The details of posts and newels are shown in Fig. 3.

Plate Girder Span—The plate girders 53 feet 3 inches overall have a web 60 inches by ½ inch angles, and flanges composed of two 8x8x⅝ inch angles, three coverplates, each 18 inches wide, one ⅝ inch by 44 feet long and two $\frac{9}{16}$ inch thick, one 36 feet long and one 26 feet long. The girders are grouped in pairs 6 feet 6 inches centers for each track, braced with two end and three intermediate cross frames. The top and bottom flanges are braced with single angle laterals arranged as shown in Fig. 5. The minimum clearance over trolley track is 14 feet 3⅜ inches.

The reinforced concrete deck slabs 13 feet wide placed on these girders to carry ballast and track are 10 inches thick, set down over girder flanges for a distance of 1½ inches so that the bottom bars, ½ inch square by 9 feet 6 inches long, 4-inch centers, rest directly on the girder flanges. In the top of slab over girders are ½ inch square bars 5 feet 6 inches long transverse, at 6 inches spacing. No longitudinal bars are used. At the center line between tracks the slabs are separated longitudinally by a paper joint, a small curb being formed in edge of slab to prevent seepage from entering the joint. At the outside edges of a slab concrete parapets or curbs 16 inches high are formed to retain the ballast.

Waterproofing—The arches and floors of deck girder span are waterproofed with a 5-ply felt waterproofing covered with a layer of brick with pitch filled joints upon which the spandrel filling or ballast are placed. The details of flashing of waterproofing at vertical walls are shown in Fig. 3. To carry off drainage from arch spans three 4-inch tile drains are run through the arch ring over each pier. The girder span being set on a 0.3 percent grade the drainage is carried out over the abutment.

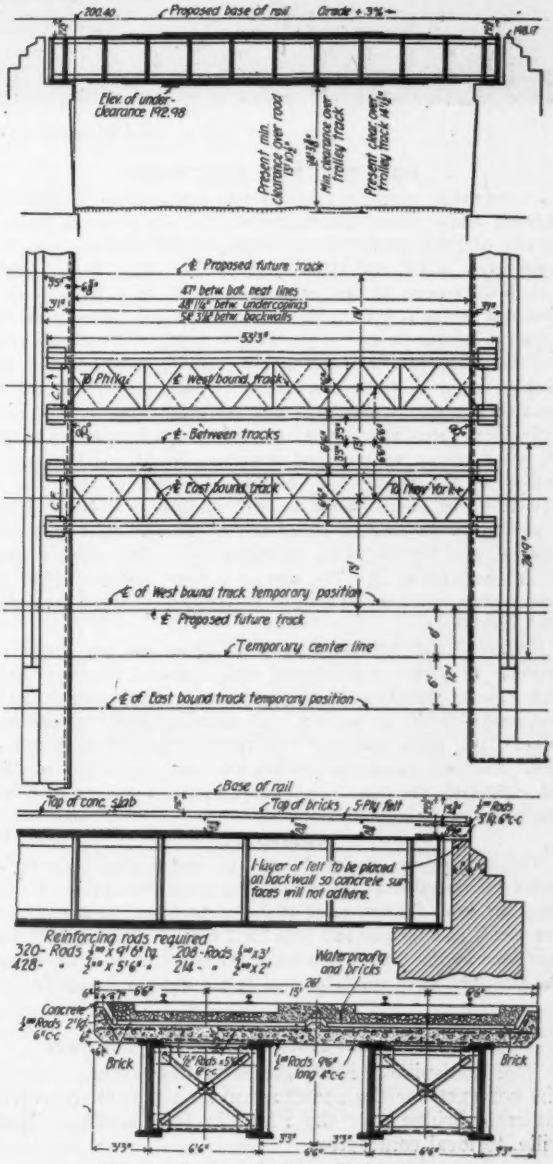

Proposed base of rail
Grade + 3%
Elev. of under-clearance 112.98
Present min. clearance over road 13'2½"
Min. clearance over trolley track
Present clear over trolley track 14'3"
℄ Proposed future track
47' betw. bot. seat lines
48'1⅛" betw. undercopings
54'3⅛" betw. backwalls
53'3"
To Phila.
℄ West bound track
℄ Between tracks
℄ East bound track
To New York
℄ of West bound track temporary position
℄ Proposed future track
Temporary center line
℄ of East bound track temporary position
Base of rail
Top of conc. slab
Top of bricks
5-Ply felt
1 layer of felt to be placed on back wall so concrete surfaces will not adhere.
Reinforcing rods required
320- Rods ¾" x 9'6" lg. 208- Rods ¾" x 3'
428- " ¾" x 5'6" " 214- " ¾" x 2'
Waterproofing and bricks
Concrete
Brick
Brick

Fig. 5. Details of Plate Girder Span.

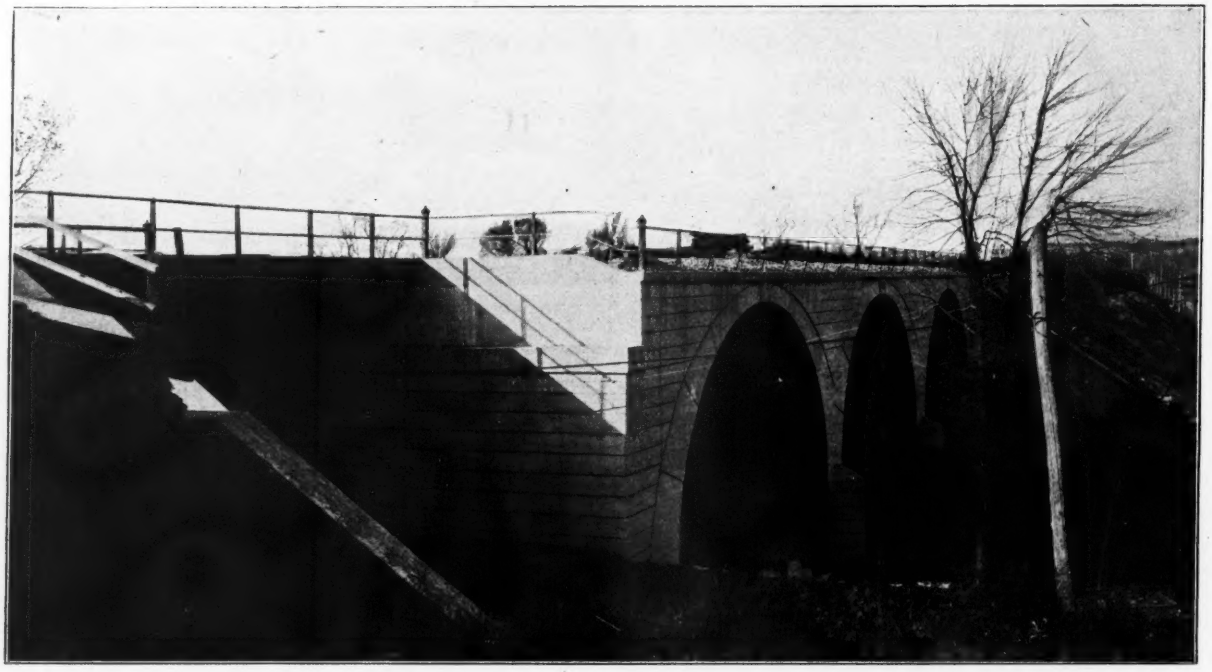


Fig. 6. East Elevation of Glenmoore Bridge from South End.

CONSTRUCTION FEATURES.

As previously stated the bridge was built in two longitudinal sections, traffic being maintained on the old structure until a portion of piers, abutments and arches 23 feet 6 inches wide was constructed on the east side of old bridge. Then a pile trestle with bents spaced 12 feet centers was built from the old north abutment to the new (See Fig. 3) and a double I-beam span supported on timber bents was placed over trolley track at south end and the tracks were then shifted over, laid 12 feet centers on new work as shown in Figs. 2 and 3, the trusses dismantled and the remainder of arches completed and the girder span erected.

The arch forms were carried on wooden truss centers supported on bents resting on pier and abutment footings. The general outline of the trusses used is shown in Section D-D, Fig. 3. The arch rings were poured in five voussoirs with keyed joints, a portion of the ring on either side of pier having been poured integral with portion above springing line. The voussoir joints are shown in Fig. 3. The spandrels were concreted after the arch centers had been struck and the arch rings taken their dead load deflection.

Surface Finish—The showing faces of all concrete except the intrados of arches were scored with V-shaped coursing joints and have a granolithic finish produced by depositing with the concrete a facing at least 1 inch thick composed of one part cement, two parts sand and two parts of granite or trap rock grit. The face forms were removed as soon as the concrete had set sufficiently and the faces washed until the grit was exposed, leaving a uniform surface.

COMMENT.

The bridge was designed and the construction carried out under the direction of the engineering department of the P. & R. Ry., Mr. Wm. Hunter, chief engineer, to whom we are indebted for plans, photographs and data used herein. The concrete work was done by the Stier-March Contracting Co., of New York, while the structural steel was fabricated by the Phoenix Bridge Co.

Louisville and Nashville Bridge Contract

The Louisville & Nashville R. R. has recently awarded the contract for the construction of a 150-ft. reinforced concrete bridge over the Franklin Pike south of Nashville, to local contractors.

SURFACE TREATMENT OF GIRDER BRIDGES

In connection with the construction of two reinforced concrete girder bridges, each with three 25-ft. spans, on the Ashokan reservoir project in New York, a rather unique method of surface finish of balustrade was evolved.

It was found that satisfactory results could not be obtained by scrubbing the surface with steel brushes and treating with acid, since when the forms were removed from the green concrete the corners and ornamental portions were broken and chipped and when the forms were left in place longer to remedy this difficulty, the surface could not be brushed.

The surface was finally finished with hand picks, while the concrete was still comparatively soft, resulting in a pleasing, rough, rustic appearance. The girders were bush-hammered to a depth sufficient to expose the coarse aggregate. The balustrade spindles were cast wet in wooden molds, 4 parts of red stone of nominal ¼-inch to ¾-inch size, 1½ parts of red stone dust and one part of cement being used in the concrete. The spindles were removed from the molds after about 24 hours, when hard enough to be handled with safety. The surface film of cement was removed with wire brushes and they were then submerged in the stream and allowed to remain until thoroughly saturated (generally about 3 or 4 days). This was followed by a 15-minute bath in dilute hydrochloric acid (1 to 5), after which the balusters were replaced in the running stream and left for several days. Those that were cast in place were made in the same way, but since they could not be submerged the results were not so good.

Missouri Pacific to Build Viaduct

A viaduct to cost in the neighborhood of $315,00 will be built by the Missouri Pacific at the Chouteau avenue crossing in St. Louis. It will span the railroad tracks on Chouteau avenue between Grand and Vandeventer avenues, now considered one of the most dangerous surface crossings in St. Louis.

Stillwell Creek Arch Bridge, Baltimore & Ohio

A Double Track, Reinforced Concrete, Three Span Arch Bridge Which Replaces a Steel Deck Girder Span

The Baltimore & Ohio R. R. has recently completed a three span double track arch bridge 176 ft. long and 33 ft. wide over Stillwell Creek near Kanawha Station on the Monongahela division, to replace a steel deck girder span, the U-abutments of which had failed due to the disintegration of the inferior sandstone composing them and to the excessive loads brought to bear upon them by the heavy traffic. By a change in alignment the bridge was constructed without delaying or inconveniencing traffic in the least.

The arches are of the segmental type, the middle one having a span of 60 ft. and the end arches a 40 ft. span. All arches have a rise of 15 ft. In line with the standard practice of this road the arches are designed to take all stresses as a plain concrete structure with reinforcement added to insure permanency and as a precaution against any weakness which might develop in an unreinforced structure due to settlement and temperature stresses. The 40 ft. arches are accordingly reinforced longitudinally with ¾ in. plain round bars spaced 8 in. centers at both intrados and extrados. The 60 ft. arch is similarly reinforced, with the bars spaced 6 in. centers.

The piers and abutments of plain concrete were carried down to solid rock from 40 to 45 ft. below base of rail in timber cofferdams. The arch forms were carried on centers supported on pile bents at middle and on concrete corbels cast on piers and abutments at ends. The back or upper horizontal surface of the lower voussoir in the arch ring were shaped and back formed by the use of a number of 2x12-inch planks for ribs or studding, cut and set to the proper curve and elevation, and held in place to withstand the thrust of the concrete by wires passed vertically through the form and fastened to the under side of the arch center lagging, one rib on each side of the bridge being spiked to the inner side of the form sheeting, forming the exterior vertical face of the voussoir. Planks, 2x10-inch, of lengths that permitted their being readily shoved into place, were then set under the ribs as the concrete filling progressed, affording ample opportunity for efficient spading and the production of a smooth, regular surface, conforming to the proper cross-section.

Concrete of a 1:3:6 mixture was used in the foundations, piers and abutments, and 1:2:4 concrete in arches, spandrels and parapets.

The entire surface of the backs of the arches and parapet walls was waterproofed with Sarco asphalt placed on each of three layers of 8-ounce burlap, in plentiful quantities with a swab while sufficiently hot to obtain complete saturation of the burlap. The burlap was stretched transversely across the bridge and carried perpendicularly up the sidewalls about a foot, each layer being lapped about 2 feet at the ends by the burlap stretched vertically on the parapet walls, which was hung after the manner of curtains, covering the entire wall from about 2 feet below the top of the coping. The layers of burlap were laid lapping each other about one-third of the width of the material, the laying being started at the lowest point of the arch and continuously carried to the top.

To perfect the sealing of the waterproofing on the sides of the parapet walls where attached to the concrete, a horizontal slot, 3 inches wide and 1½ inches deep, was provided in the concrete about 2 feet below the top of the coping, into which the ends of the burlap were embedded in hot asphalt, and pressed tightly to the edges and back of the slot, sufficient asphalt being supplied to fill all interstices. This type of treatment was also adopted at the ends of the bridge, the vertical slot being placed 2 feet in from the ends of the walls. After the layers had been applied in this manner, rolls of oakum saturated to dripping with hot asphalt, were forced into the burlap depressions in the slot and smoothed with a spatula, until flush with the burlap surface. After completing the waterproofing about 2 inches of loose sand was carefully spread over the entire surface of it to prevent possible injury to the underlying asphalt coat.

CURRENT PRICES—CONCRETE MATERIALS.

Portland Cement—The prices in the Eastern cement market are considerably lower than those quoted last month. In the South and West the prices are unchanged and the demand is about the same. Prices given f. o. b. cars at points named, including cloth sacks, for which, in general, 40c per barrel (4 sacks) is refunded on return in good condition. Prices per barrel (including 4 cloth sacks) are as follows: Boston, $1.66; New York, $1.42; Chicago, $1.41 to $1.45; Pittsburgh, $1.40; New Orleans, $1.64 on dock; Memphis, $1.64; Cleveland, $1.53; Detroit, $1.49; Indianapolis, $1.58; Peoria, $1.49; Cincinnati, $1.59; Columbus, $1.58; Toledo, $1.53; St. Louis, $1.45; Milwaukee, $1.50; Minneapolis and St. Paul, $1.60; Kansas City, $1.43; Cedar Rapids, $1.50; Omaha, $1.43; Spokane, $1.75; Seattle, $2.30; Tacoma, $2.30; Portland, Ore., $2.30; Duluth, $1.73.

Crushed Stone—1½-inch stone, prices per cubic yard, f. o. b. cars in carload lots, unless otherwise specified. Boston, 80c per ton at the quarry; New York, 90c to $1.00, in full cargo lots at the docks; Chicago, $1.15; Spokane, $1.00; Portland, Ore., $1.15; Seattle, $1.50.

Gravel—Prices given are per cubic yard f. o. b. cars in carload lots unless otherwise noted. Boston, 75c; New York, 90c in full cargo lots at docks; Chicago, $1.15; Spokane, $1.00; Portland, Ore., 85c; Seattle, 75c; Tacoma, 75c.

Sand—Prices are per cubic yard f. o. b. cars in carload lots unless otherwise indicated. New York, 50c, full cargo lots at docks; Chicago, $1.15; Spokane, 75c; Seattle, 75c; Portland, Ore., 85c; Tacoma, 75c.

Reinforcing Bars—Prices in general are the same as those quoted last month. Pittsburgh base quotations on mill shipments f. o. b. cars are from $1.10 to $1.15 per cwt., with the prevailing extras on bars under ¾ inch or base. The following are quotations on base bars per 100 lbs. for mill shipments from other points, f. o. b. cars: New York, $1.26; Philadelphia, $1.25; Chicago, $1.28; Spokane, $2.20; Seattle, $1.85; Portland, Ore., $1.90; Tacoma, $1.85.

Shipments from stock are being made at the following prices per cwt. f. o. b. cars: Pittsburgh, $1.50; New York, $1.95; Cleveland, $1.80; St. Louis, $1.80; Chicago, $1.85; Spokane, $2.50; Tacoma, $2.20; Portland, Ore., $2.15; Seattle, $2.20.

Metal Clips for Supporting Bars—$4.50 to $6.50 per 1,000, depending on size.

For the majority of the prices given we are indebted to the Universal Portland Cement Co., Sandusky Portland Cement Co., Concrete Steel Co., American Sand & Gravel Co., Chicago, and F. T. Crowe & Co., Seattle, Portland, Spokane and Tacoma.

Reinforcing bars for mill shipments are in general sold on a Pittsburgh basis; this is, at the Pittsburgh quotations plus the freight to the point in question, and with the following list of freight rates on finished material and the Pittsburgh quotations given, the prices of bars at any of the points listed can be readily computed.

From Pittsburgh, carloads, per 100 pounds to:

Albany	16 cents	Columbus	12 cents
New York	16 cents	Cincinnati	15 cents
Philadelphia	15 cents	Louisville	18 cents
Baltimore	14½ cents	Chicago	18 cents
Boston	18 cents	Richmond	20 cents
Buffalo	11 cents	Denver	84½ cents
Norfolk	20 cents	St. Louis	22½ cents
Cleveland	10 cents	New Orleans	30 cents
Minneapolis	32 cents	Indianapolis	17 cents
Kansas City	42½ cents	Omaha	42½ cents
Birmingham	45 cents		

New Books

THE PRESERVATION OF STRUCTURAL TIMBER. By Howard F. Weiss, Director, Forest Products Laboratory, U. S. Forest Service. Cloth, 6 x 9 in., 303 pages, 8 pages of index, profusely illustrated. Published by McGraw-Hill Book Co., New York. Price, $3.00 net.

This book speaks of the importance of wood preservation as an American industry and the present standing of the wood preserving industry in the United States. A synopsis of the history of wood treating from earliest Egyptian times to the present day is given. The chapter on the causes of deterioration of structural timber is extremely interesting and well illustrated, and depicts the various types of wood destroying fungi. The causes of deterioration of railroad ties and telegraph and telephone poles are also clearly shown. There is a very complete chapter on the operation of wood preserving plants.

Chapter VIII deals with the prolonging of life of crossties and is complete with illustrations and tables showing cost of treating ties of different wood species. This chapter is of particular interest to railway maintenance of way officials.

Chapter XX, 56 pages, is devoted to appendices of processes, apparatus and tests devoted to the preservation of timbers. This chapter is followed by an index of 8 pages.

This is one of the first authentic publications on this important question and it is well worth while for every railway official interested in the preservation of timber to add a copy to his library.

LEFAX. This is the title given to what the publishers in the sub-title call "An Engineer's Loose-leaf Pocketbook, Self-Indexing Reference Library and Condensed Catalog File." It consists of a morocco-bound, loose-leaf cover of pocketbook size and cloth-bound filing boxes, both of size for holding the leaves. There are now published 422 leaves of two pages each, 91 devoted to useful tables, 125 to civil, 68 to electrical, 126 to mechanical and 12 to mining engineering subjects. Each month additional data sheets are published. Condensed data from manufacturers' catalogs are also published as is a data news supplement.

The convenience of this may be seen if one will conceive his Foster, Gillett, Kent, Kidder and Trautwine as being in an indexed box in loose leaves, each kept up to date by monthly supplements, and he having a loose-leaf pocketbook in which he can insert such data from these as his daily needs require, and be able to compile personal data on similar sheets and insert in proper place, making all his acquired knowledge instantly available.

The idea of this work is most excellent. Its permanent value will depend on the care with which data is compiled and the fitness of its compilers. The sheets so far issued are somewhat unequal in quality, but hold a promise of future increasing excellence. Standard Corporation, Pennsylvania Building, Philadelphia. Price, $2.00 per year. New supplement, 50 cents.

THE REGULATION OF RIVERS. By J. L. Van Ornum, Professor of Civil Engineering, Washington University and formerly United States Assistant Engineer, New York. McGraw-Hill Book Co. 400 pages. Price, $4.00 net.

This is a well written work, treating a subject not well understood, from the point of view of an educated engineer who has wrestled with the problem, has striven with the river in all its moods, thinks understandingly and writes clearly. The principal value of this work to the railway engineer or maintenance official is in chapter VII, which discusses bank protection; chapter IX, which concerns levees; and chapter X, which treats of control of the current. The earlier chapters are given to laying a solid foundation for understanding the problems. Probably two-thirds of the money expended in experiments in bank protection along alluvial streams has been wasted and the remainder has been less effective than it might have been. A study of this work will enable any maintenance man to avoid repeating these follies. To any engineer, whose work requires him to consider stream danger the book will be a trustworthy help.

CONCRETE-STEEL CONSTRUCTION. PART I. BUILDINGS. By H. T. Eddy and C. A. P. Turner. Cloth, 6½x9 in.; 438 pages; 99 illustrations. Published by C. A. P. Turner, Minneapolis. Price, $6.00.

This new work is the outgrowth of Mr. Eddy's little book on the "Theory of the Flexure and Strength of Rectangular Flat Plates Applied to Reinforced Concrete Floor Slabs," which was reviewed on page 339 of the August, 1914, issue of *Railway Engineering;* the material contained therein, with some slight changes and ten pages of new matter, make up chapters V and VI of the latest book. Being written by a skilled mathematician and a practical engineer, the book will be found especially acceptable and useful to men in these lines of work. Although called an elementary treatise the theoretical chapters III to VII inclusive are entirely unsuited for use of the student. In general the points emphasized and dwelt on are those which are generally "skimmed over" in other books on the subject and this gives the volume a special value.

The first chapter deals with materials, mixing and handling concrete, bending reinforcement and centering. Chapter II, on general types of concrete floor construction, deals mainly with the subject of deflections. The general theory of reinforced concrete beams is presented in chapter III, together with a discussion on bond shear. The next chapter, on beam action and slab action compared through application of the laws of bond and shear and the theory or work, is given to bring out the nature and characteristics of the predominant mechanical actions in flat slabs and they introduce the more rigorous analysis given in chapters V and VI, which we have previously reviewed, as mentioned above.

In chapter VII the commercialism spoken of in the previous review crops out again in a very biased comparison of moments in the two-way and four-way flat slabs and weights of steel required in both. With all due respect to the authors the reviewer maintains that it does not require 30 per cent more steel in the two-way slab than in the four-way to carry the same load with the same deflection. This erroneous comparison is materially aided by not including in the weights of steel the head-frame steel required for the mushroom system and the raising bars for the two-way system, even though it has always been argued that the head-frame bars are absolutely essential to the mushroom system, while the raising bars for the two-way system are not counted as reinforcing steel. On page 258 we find that the head-frame steel for a mushroom test slab 18.4x17.8 feet was 435 pounds, with 650 pounds of steel in the belts; in other words, 0.4 of the total steel was used in the head frames; now for a two-way system the weight of raising bars would have been about 40 pounds. This shows at a glance how unfair is the comparison made on page 276 when the head frame and supporting steel is not taken into account.

The reviewer also does not agree with the statement made on page 277, "that reinforcing rods across the top of the side belts in four-way slabs are unnecessary and superfluous, and that the cracks occasionally observed extending along the middle of the side belts do not indicate any structural weakness." If not an indication of weakness they must needs be one of strength, yet no engineer in possession of all his senses would argue that cracks indicate strength; in fact, they prove that there is a lack of reinforcement in the region in which they occur and the issue cannot be dispelled by a bald, misleading statement. The remainder of the chapter deals with rectangular panels and hollow tile and concrete floors.

Chapter VIII treats of reinforced concrete columns and the succeeding one is a very short and incomplete discussion of foundations. The remaining chapters on cost of reinforced concrete work, fireproofing, rust proofing, concrete floor finish, artistic and commercially practicable concrete surface finishes, and execution of work and a discussion on patents, are in the main very interesting and instructive except for the latter, where the spirit of commercialism again comes forth.

The general make-up of the book is good, but the typography is marred by a considerable number of misspelled words and other errors. The work, although somewhat biased in many points and disclosing a tendency not to treat the subject from a broad, fair-minded standpoint, has its place and should do much toward evoking discussions and further and broader treatises on flat slab construction.

STRUCTURAL STEEL DRAFTING AND ELEMENTARY DESIGN. By Chas. D. Conklin, Jr. Cloth, 9 x 12 in., 154 pages. Numerous tables, illustrations and line drawings. Published by John Wiley & Sons, New York. Price, $2.50 net.

A book designed as a guide for the technical school drafting room, giving the student such information regarding the methods of detail drawings as are not found in ordinary text-books on design. Realizing that all information relating to shop drawings cannot be given, the author has endeavored to give such examples as will give the student a good working knowledge of the detailing of typical structures.

The first five chapters are general and treat of drafting room organization, estimating and designing, equipment, ordering material and detailing elementary shapes, and rivets and riveted connections. Chapter VI treats of beam and column detailing as related to office building work. The next two chapters deal with design and detail of wall girder and column and a steel roof. The design and detail of deck and through plate girder railway bridges, a highway bridge and through riveted railway spans are next taken up in a clear and concise manner. Chapter XIII is made up of a collection of detail drawings of the American Bridge Co. for railway truss bridges. Although not complete, they give all the principal details. The book ends with a chapter on hip and valley details and an appendix of the A. R. E. A. General Specifications for Steel Railway Bridges.

The general make-up of the book is excellent and it should be welcomed by the student and engineer who has had little experience in detailing and desires a reliable guide.

Semi-Annual Meeting National Association of Scale Experts

Account of Discussions and Excerpts From Papers Read at the Semi-Annual Meeting Held in Chicago, February 1 to 3

The eleventh semi-annual meeting of the National Association of Scale Experts convened in the Fort Dearborn Hotel Monday, Feb. 1, for a three-day session. After registration of the members and visitors, of whom there were sixty-eight present, an address of welcome was made by Leo Hornstein, assistant corporation counsel, substituting for Mayor Harrison, who was prevented from attending. This was fittingly responded to by C. C. Neale, Commissioner of Weights and Measures of the State of Minnesota, after which the minutes of the July meeting were read and approved.

There being no unfinished business, the meeting adjourned until two o'clock.

On reconvening, Mr. A. Malmstrom, chief scale inspector of the Santa Fe System, read a paper on "Installation, Maintenance and Care of Track Scales." He first dwelt on the importance of the foundation, and that it must be solid and unyielding. That as a first proceeding the engineering department should make soundings at the site and determine if suitable foundations were obtainable. He recommended going to rock, if that were possible, but if solid rock, dry sand or gravel were not reachable, that piling be resorted to. He recounted that on the Santa Fe they had all manner of soils to deal with, alluvium of the gulf coast, uncertain on the Pacific, sands in Arizona, rock in New Mexico and Colorado and clay and gumbo in Kansas and Missouri. He gave some account of the foundations of a scale at San Francisco, where it was installed on filled ground overlaying sloping rock. Thirty-six piles were first driven, which were sixty feet long, to rock, on which was laid concrete to a depth of three feet, in which was imbedded 1,740 lineal feet of rails of 60 lb. weight, or over. On top of this mat was built the scale pit. This pit moved bodily two inches without injury. The great fire put it out of level two and one-half inches, but it was possible to use it still with small adjustments. It was later leveled up at a cost of $800.00, although the concrete pit was not injured.

At Galveston a foundation required the driving of forty-nine twenty-foot piles on which was placed a ten-inch layer of concrete. On this was built a box of roofing paper, using five layers and fifteen barrels of tar. Inside this the concrete pit was built, taking care in placing the concrete not to injure the paper. In finishing "Ironit" was applied and one inch of waterproof plaster, after which the pit was filled with water and left until the plaster hardened.

Another pit at Galveston which had to withstand the force of waves was given a protection of eight thicknesses of the tarred paper. In this case the waterproofing was put into the concrete. It was made by using 400 lbs. of alum and 400 lbs. soft soap to 120 cubic yards of concrete.

It is often found necessary to drive from thirty to fifty piles to secure a satisfactory foundation.

As to location, he named three desirable conditions. 1. Where cars can be handled cheapest. 2. Convenient to the building where the weighmaster is located. 3. Where a gravity drain is procurable.

In installing the scale he mentions three principles which must be observed. The work must be: 1. Plumb. 2. Level. 3. Square. In installing a scale the aim should not be to see how cheap it can be done, but how well it can be done.

As to the care of scales he emphasized the need of frequent examinations and tests by a scaleman, and advised that the agent be so informed that he can make daily tests with a loaded car and quickly detect when the scale becomes in any degree out of order.

He condemned the practice of jacking a weigh bridge off its bearings to examine the pivots. Advised the use of grease on the steel parts, as corrosion is more destructive than wear. He emphasized that grease must be such as will retain its solidity in all weathers, and that the loops be filled with grease, but not to let it reach the members or to use it on bearings above the deck, as here the multiplication is so great that the friction caused by the grease would affect the weighing. He stated the grease costs six and five-eighths cents per pound and twenty pounds were required for an application.

In the discussion which followed, F. H. Schlinkert, Missouri Pacific, reported some trouble from loose pivots from use of grease. Other members questioned if the heavy application of grease would not render the scale sluggish. This was denied by those who had used the grease, they stating that tests made revealed no appreciable sluggishness as between the before and after tests. Neal Dugger, Birmingham Southern, advised that the cleaning be well done, and told of a case where the scale was cleaned by blowing the pivots and loops clean by the use of compressed air and applying a hard oil in the same way. D. J. McGrath differed with the paper, claiming that it often happened that the scale was driven and the cross levers displaced to an extent that the scale would not do good work until it had been jacked up, or shaken up. This was admitted, the author claiming that he only meant to condemn the raising of the weigh bridge where it was merely to clean the bearings.

D. J. McGrath, scale inspector for the State of Minnesota, then read a paper on the testing of track scales. The state has inspected track scales since 1906 and Mr. McGrath has been in the service since that time. He spoke of the errors in scales from the nose irons becoming shifted. In one case a track scale showed under tests, with the test car on different parts of the scale, errors of 200 pounds, 360 pounds and 400 pounds. After nose irons were put to the factory mark the scale tested correctly. Another scale which he tested June 22, 1914, weighed his 100,000 pound test car as follows:

	1st Test.	2nd Test.	3rd Test.
North section	99,680	100,000	100,000
Central section	99,360	99,320	100,000
South section	98,760	99,700	100,000

All that was done was to shake up the scale. While this was an exaggerated case, he has often shaken out an error of 500 lbs. in some section. This is not all due to dirt and grease in links, as it is possible for a pebble to become wedged in loop and the shaking up will break it.

He also called attention to the effect of weather conditions on a track scale. He has noticed that as soon as cold weather sets in those track scales that are so located as not to be artificially heated become quick, that is, weigh heavy, from sixty pounds to 120 pounds. At the same time those scales which are located alongside mills so the pit is warmed do not show this error. He cited that while the tolerance of the state of Minnesota was but 100 lbs. on the 100,000 pound test car, and the bureau of standards test car work allowed 200 lbs., that owing to the concentrated loading of the latter on its five and

a half foot wheel base the latter test was the most severe. He called attention to the fact that men installing a scale often left it in an unsatisfactory condition. He cited one instance where a chunk of cement had been allowed to fall into the scale parts in a way that made the scale inaccurate, which error was remedied by cleaning out the chunk. He cited where a case of check rods out of level had caused an error of 200 pounds too light in a scale.

A paper was read on automatic scales by a representative of one of the scale companies, which was challenged by the representative of another, and for a time the atmosphere warmed up a little. Then another maker exhibited an automatic grain scale. This works on the principle of a simple balance, a weight of 1,000 lbs. plus is on one end of the beam and a brass hopper on the other. When the hopper is filled with grain it dumps, that is dumps when it holds 1,000 lbs. of grain. It is absolutely accurate and simple. The trouble comes from the selling of grain by the bushel, and there is a difference with grain weighing sixty, fifty-two and thirty-two pounds to the bushel, which has led to errors in records.

The programme for the forenoon of the second day, as announced, was a visit to a local scale shop "where practices were demonstrated by experts in the fitting and sealing of levers." The association dinner at the Fort Dearborn Hotel was a success and was immediately followed by the meeting, the members remaining at the tables through the afternoon. The first event was the calling by the president on Mr. Fred Berry, of St. Paul, for some remarks. He referred to the first meeting when the membership was twenty, and to the splendid growth of the association, which showed the need and appreciation of the association.

Roland Folk read a paper on foundations, taking the article on pages 38 and 39 of January *Engineering* as the assumptions. He showed the necessity of great strength in side walls in the northern states to resist action of frost, a point not sufficiently considered. Also called attention to the need of an examination of the soil where the scale is to be located before the foundation plans are made. He then analyzed by using a large scale drawing embodying the figures in those on page 39 of January number of *Engineering* and showed the load which must be considered for each section. He recommended a concrete pit of 1-2-4 mixture, but would not commit himself on the matter of reinforcement.

Mr. Kinnaird, Pennsylvania Lines West, spoke of his recent installation of a scale of large capacity with a 52-foot length of scale rail. He found an abundance of old iron and steel which had but a scrap value, and which was suitable for reinforcing, which he used with good results and small costs.

Mr. Headwell, of the Boston & Maine, was called on by the president and before getting into the current discussion spoke his mind as to the practice of moving nose irons. This is to be deplored, and used only when absolutely needed to restore correct multiplication. Spoke of the number of scales on his line and call for accurate weighing, and described local conditions leading to certain methods adopted. He emphasized the absolute necessity for foundations absolutely solid and pits absolutely dry, and that no matter how well drained a pit was it would be damp and tend to ruin of the scale mechanism unless some method of heating was adopted. He has installed stoves in the neck under the scale house with the pipe running up alongside the beam, carrying the pipe up twelve feet. These stoves use two hods of coal per day and the pit is kept dry and the scale in good condition. He also spoke of a difficulty experienced where scale levers were exposed to strong drafts of air. He overcame this by boxing in the levers.

Mr. H. O. Hem then read a paper discussing some of the errors which occur through certain defects in scale installation. This called for a description and sketch of a scale lever and the links suspending it. The paper was hastily prepared to fill in for a speaker who failed to keep his appointment, and the speaker frequently left the written paper for a running discussion of the drawings.

The next paper was by J. A. Schmitz, editor of the *Scale Journal* and head of the scale work of the Chicago Board of Trade. He sketched the conditions which led to a change from the measured bushel in the handling of grain to the weighed standard. Recounted the steps which led to the authorizing in 1850 of the Board of Trade to fix standards for weighing of grain in the Chicago market. The department, which is headed by H. A. Foss as superintendent of weighing, has grown until its force inspects empty cars before loading to see that they are empty and clean and the loaded cars to see that they are properly loaded, closed and in shape to convey the grain safely, to the amount of 400,000 per year. Also the weighing of 150,000,000 bushels of grain into steamers and vessels, the total last year being 610,000,000 bushels weighed by the force. He described their equipment for testing and repair of scales, all scales being inspected twice per year and as much oftener as there is complaint. Any new scale installed must show accuracy and that it will probably give good and lasting service. No scale is condemned until after the maker has been given opportunity to correct the error and has failed to do so. He touched on the mooted question of tolerance, stating that as the scales under their charge were used for weighing for the fixing of payment in sale, and the cost was from 1½ to 3 cents per pound, no tolerance was allowed, but that scales must be accurate.

C. F. Byerly was the next speaker, and made a "get together" address, calling on all to bury differences, get together and boost the work of the association, spoke of the things accomplished and what the association could do by united effort. It was enthusiastically received.

J. K. Conner spoke of the question of tolerances. He was a member of the National Conference on Weights and Measures which framed the tolerances of that association, and said that these were the result of much study and he asked they be given the consideration which an earnest effort deserved. He spoke of a visit to a scale pit heated by a stove, and finding the fifth lever too hot to hold one's hand on, and asked what would be the effect on accurate weighing. He called attention to the very serious question of making tests official. In many states a scale record cannot be used as evidence unless the scale has been tested and sealed by the state sealer. The state sealer having but two to five thousand pounds, sometimes less, of test weights, cannot test a track scale satisfactorily, and he stands in danger of imprisonment if he should use any standard save his official weights for testing. He urged consideration of this phase, and that action be taken to have test cars standardized.

John Ammons, chief weighmaster of the Duluth, Missabe & Northern, was the next speaker. This company weighs during the summer season as high as thirteen and one-half million tons of iron ore. Their sscales are well installed, but have no special frills, being of the older type of bearings. The test car is standardized by the Minnesota Railroad and Warehouse Commission and the track scales are tested daily during the shipping season. Weights are ordinarily taken by a recorder, the train being hauled over the scales coupled, engines running over scale rail. Repeated tests show that these weights check with the same cars spotted and weighed

by hand, standing still, so very close as to be almost incredible, on one occasion to within eight pounds per car. In one test seventy-five cars were weighed in the evening in a train and the next morning ten of them were sent over the scales again and the weight secured was exactly what was shown by the same cars the preceding evening.

Mr. H. A. Foss, superintendent of weighing at the Chicago Board of Trade, congratulated the association on what it has accomplished and wished good luck for the future.

Mr. Van Dyne, recently appointed state sealer of the State of Iowa, spoke of the work in his state, the grain grown in which has a yearly value of one billion dollars.

The papers of the third day had no large interest to those concerned with the maintenance of track scales, being on the methods of weighing, particularly from a salesman's standpoint.

The first paper was "Weighing and Recording of Weights," by L. M. Allen, of the Western Weighing Association. His opening statement was that weighing was as old as the hills, and about the first thing which happened to a person after his birth was that he was weighed. The points in this paper which interest our readers was the recommendation that track scales be located with regard to the work to be performed and not where they would look best on the blue print. That house scales be set near the receiving door, and not in the middle of the floor, as is customary. He recommends dial scales for less than carload weighing, and cautioned against ever at any time trusting to memory, insisting that record be made as soon as the weighing is done. The paper bristled with suggestions for the betterment of weighing results and is worthy of careful study from the operating officials, but it should be criticized for its condemnation of scales with more than four sections. There is just one reason for preferring a four section scale. That reason is that poor installation and incompetent supervision are less hurtful in this class than with scales with more than four sections. If a company expects to use stupidity to install and ignorance to supervise and maintain the argument is good. If the aim is to secure the scale which will give best results when intelligently cared for this dogmatic assertion favoring a four section scale is very hurtful. It is like advising a man to wear a New Haven clock instead of a Howard watch, because the former is simpler and easier to repair. Or to use a plate girder bridge instead of a riveted or pin connected type. The paper was excellent where the author confined himself to matters he had mastered and only fell down where he judged from the results and did not analyze to see if stupid supervision was not the fault instead of design.

The second paper was by Mr. F. C. Maegley, of the Santa Fe, on "Recording Weights—Calling Every Weight by Its Right Name," and was a thoughtful paper on one phase of the evils in the present system of weighing. A weight, if made by the railroad, should be called the railroad weight; if made by the shipper, should be called the shipper's weight, and if made by the weighing association or Board of Trade should be called their weight.

The author has given much study to this subject, and his deductions are worthy of consideration, but have small interest to maintenance men, and are not given here.

The next paper was by Charles F. Bruning on "Scales from the Viewpoint of a Salesman." The paper dealt almost entirely with the lighter scales, but emphasized the ideal condition when a salesman would so understand scales as to advise with the buyer and suggest the scale best fitted to his use, and when the salesman should understand the qualities of his competitor's scales and by inference when he will treat the competitor fairly.

E. Motchman complimented the association on what it had accomplished and suggested that it was now strong enough to advance on the East, holding a meeting at an early day at Pittsburgh. He also showed samples of what he called "half steel and half iron," a combination metal made by James Neill & Co. of Sheffield, Eng. This is not made in this country and the maker has no selling agent here. It is actually a combination of hard and soft steels. One side being so hard it will cut glass and the other so soft as to be easily worked. He claimed that with this a knife edge, or pivot, can be made of any length, or even made in sections. It can be made straight and true. He advocated that slots be machined out of levers for pivots, and they be made removable and replaceable, that the work of the accurate milling machine replace the clumsy method of relying on the casting. A lever can be milled, and the pivot be made replaceable so it will not vary one-thousandth of one inch. A casting in a lever will not cool as accurately as this.

Mr. Motchman spoke somewhat technically on the advantage of the heating furnace over the forge. The former when the pivot is kept in the flame for twenty minutes is evenly heated through. The pivot when in the fire of the forge for from five to fifteen minutes appears thoroughly hot, but the center is not. Then by plunging into the water, the outside is cooled quickly and the center more slowly. Strains develop in the steel and as it is worked these internal strains cause warping. To overcome this, it is necessary to work it partially and then let it season before finishing. The heating furnace and pyrometer will overcome many of the troubles with getting a good temper to the pivot and leaving it straight and in such shape as to give an even bearing.

Mr. H. O. Hem was the next speaker. He spoke of the fact that all steel had a tendency to spring, that saws sprung in tempering, as did knife blades, yet all were made straight, and it was possible to have the distorted pivots made straight. If the scale design was such that the pivot had a backing of casting, that would straighten it and keep it so. He then discussed the point illustrated in Fig. 10, page 30, January *Engineering*, and described results. A series of questions were put to the speaker and answered by him, leading to a most enlightening exposition, which is worthy of being given an entire article.

The closing session opened by the report of the credential committee reporting on thirty-four candidates, who were elected to membership.

Several changes were made in the constitution, the honorary member being made such actually, the old grade being changed to associate member. It was voted that the president appoint a committee to attend the meeting of the American Scale Men's Association and see what can be accomplished toward amalgamation of the two associations, keeping in mind that this is the older organization, and that the consolidation should be a give and take affair.

Election of officers resulted in the choice of the following:

President, C. G. Stoody, Chief Scale Inspector, Rock Island Lines, Chicago.

Vice President, D. J. McGrath, Scale Inspector, Minnesota Railroad and Warehouse Commission, St. Paul.

Secretary, J. A. Schmitz, Editor *Scale Journal*, and Chief Scale Inspector, Chicago Board of Trade.

Treasurer, A. C. Johnson, Scale Inspector, Great Northern Railway, St. Paul.

Executive Committee: A. Malmstrom, chief scale inspector, Santa Fe System; F. H. Hedwell, Boston & Maine Ry., Boston; C. F. Byerly, American Scale Co., St. Paul, and B. B. Gordon, chief scale inspector, Pennsylvania Lines West, Columbus, Ohio.

Credentials Committee: A. G. Zeibel, scale inspector, Chicago Great Western, Oelwein, Ia.; W. E. Wells, scale inspector, C., B. & Q. Ry., Chicago, and P. J. McFarland, scale inspector State of Minnesota, St. Paul, Minn.

It was voted to hold the next meeting in Chicago Monday, Tuesday and Wednesday, August 2, 3 and 4, 1915. Only one dissenting vote was given, Neal Dugger loyally voting for Birmingham, Ala.

Votes of thanks were given to the executive committee, to the management of the Fort Dearborn Hotel and to Mr. J. A. Schmitz.

The report of the treasurer showed a balance on hand at close of last meeting of $18.40, receipts since of $252 and disbursements of $183, leaving a balance of $87.41 on hand.

It would add greatly to the interest if the papers were printed a month in advance of the meeting and sent out to the membership so the matters therein could be more intelligently discussed, as is done in the engineering associations.

Mr. H. A. Foss, of the Chicago Board of Trade, was made a life Honorary Member without dues.

GENERAL NEWS

The Hallgarten & Co. have exercised an option on $1,000,000 Bethlehem Steel Corporation first and refunding 5 per cent bonds. In this connection, $1,000,000 of Bethlehem Steel Corporation 5 per cent notes have been cancelled. The original option calls for a total of $4,000,000 bonds.

Owing to deficiencies in railway service in getting supplies to the earthquake region in Italy, an inquiry into the situation was ordered. Sig. Blanchi, director general of railways, who considered the inquiry a reflection on his directorship, resigned his post, and the council of ministers accepted it.

Proposed class and commodity rates from Chicago, Mississippi and Missouri river points and intermediate territory to Utah and common points were declared by the interstate commerce commission to be justified.

The commission approved the higher rates proposed by the Northern Pacific and the Chicago, Milwaukee and St. Paul roads on mixed carloads of cement, lime, stucco, plaster, roofing pitch and salt from St. Paul, Minneapolis, Duluth and points in North Dakota and Montana.

The trustees of the Boston and Maine Railroad have issued the draft of the proposed bill by which legislative authority is asked for the merging of the company and the thirty-six lines it operates under lease. The plan also provides for the elimination of the New York, New Haven and Hartford Railroad in Boston and Maine affairs.

The Canadian railway commission will be asked by Candian railroads for permission to increase freight rates throughout the Dominion, if increases now being asked because of changes in United States railroad rates be granted.

Grand Trunk railroad officials announce their intention to ask 14,000 of the emploes in Canada and the nUited States to accept a decrease in wages April 1, if traffic receipts continue to decrease.

Some of the important Canadian loans sold in the United States during the past few weeks are: Toronto Ry. Co., $1,500,000; Victoria Rolling Stock & Realty Co. (guaranteed by Canadian Pacific Ry.), $12,690,000; Winnipeg Electric Railway, $1,500,000, and Canadian Northern Ry., $2,000,000, total $17,690,000.

The State Public Service Commission of Ohio has granted permission to Toledo Terminal to issue $100,000 of bonds for extension and improvement work.

The Union Pacific contemplates ballasting 71 miles of line between Ellis and Oakley, Kan.

The Union Pacific is reported to have decided to double-track 29 miles of its line through Weber Canon, Utah. Plans are understood to provide for second track 50 feet above present one. Improvement will call for considerable rock work and will cost $75,000 to $125,000 per mile.

The Engstrom-Hosford Company, of Northfield, Minn., has been awarded a contract to grade 85 miles on the Van Horn Valley, for which King & Runquist, of Duluth, Minn., are general contractors. Work will be sublet in section. Joseph Irby, Van Horn, Tex., is secretary of the railroad company.

The Vandalia has made surveys for 4-mile spur from White Rose mine in Linton coal field to the Southwest mine in Indiana.

The New York, Chicago & St. Louis will enlarge its yards at Conneaut, Ohio.

The Pennsylvania plans to resume at once its yard extension work at Sandusky, O., and to complete it early in summer.

The New York Municipal Ry. Corp., 85 Clinton St., Brooklyn, is reported to be calling for bids for 2 miles of elevated railroad on Jamaica ave.

The North Charleston Corporation, R. G. Rhett, president, has arranged with the Southern, the Atlantic Coast Line, and the Seaboard Air Line to build a belt line railroad to connect North Charleston industrial plants with various railway lines.

The Youngstown & Southern Electric proposes to double track from Front street station to Southern Park, Ohio.

The Northern Pacific is reported to contemplate several improvements from recently acquired Gilmore & Pittsburgh R. R. These include change in 20 miles of line, reducing grades and involving construction of two tunels, one about 1 mile long in Montana.

Work is to be started soon, it is said, for the extension which was projected over a year ago from the preseht northern terminus of the Ocilla Southern at Rochelle, Ga., north to Macon, about 80 miles. The company has secured an amendment to its charter, and the stockholders have acted favorably upon a proposed increase in capital stock of from $1,000,000 to $3,000,000.

Frank Brown, of Independence, Kan., has purchased from former Gov. Charles N. Haskell the Oil Belt Terminal R. R. under construction from Jennings, Okla., to Oilton, in the Cushing field. It will be completed and in full operation in about two weeks. It is about 10 miles long.

The Oregon Short Line is reported to have authorized improvements to its Yellowstone branch. This will include completion of work begun in other years and driving 480 feet tunnel at Gibraltar.

The Baltimore & Ohio has filed a mortgage at Whitesburg, Ky., to secure $5,000,000 worth of bonds, preparatory, it is said, to entering the eastern Kentucky coal fields in competition with the Louisville & Nashville.

Employes of the shops of the Louisville & Nashville at New Decatur, Ala., now are working five days a week, whereas formerly they worked only four days.

THE CAMBRIA STEEL CO., has declared the usual quarterly dividend of 1¼ per cent.

The basis for a great resumption of active business is present in the condition of retail stocks, which are low, and in the great wealth of the agricultural classes through high prices realized and being realized for their products. What is needed is a great buying movement. This must come initially from the railroads. Railroad buying has not started in volume, but there are evidences of coming activity in this direction both in rails and equipment. Business in steel, textile fabrics, food products, leather and rubber show improvement through increasing orders, with some price tendencies upward. Sentiment is bettering, but betterment is more than sentimental; it is getting to be actual. The stimulation of foreign purchases is helping domestic trade. In copper there is a lull in buying, but those in touch with the situation look for resumption of activity soon and further strengthening of prices. There is no let-up in consumption of copper in the fighting countries, and it is certain that there will be a steady absorption of metal for a long time to come, on armaments. The stock market is giving a good account of itself. For investment, there has probably not been for years such an opportunity to purchase good securities at low prices.

The Maintenance of Way Department

Mechanical Life of Ties as Affected by Ballast

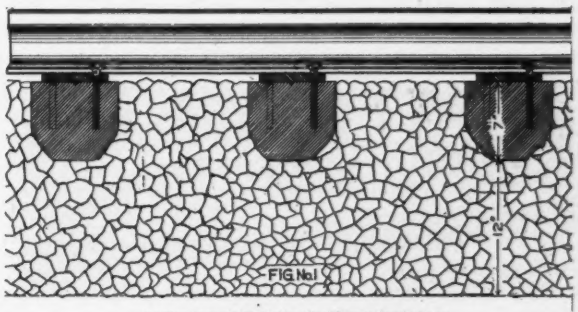
Observations of Service Conditions as to Mechanical Wear of Ties. Paper Presented at the Annual Convention of the American Wood Preservers' Association, Chicago, January, 1915

BY E. STIMSON.

The wooden cross tie, transmitting the heavy axle loads from the rail to the ballast, is subjected to mechanical wear not only from the action of the rail on top of the tie, but also from the action on the sides and bottom of the tie of the ballast which supports it. The most familiar causes of the deterioration which makes necessary the removal of the ties from the track are, decay, splitting, mechanical wear under the rail, spike killing, burning due to dropping coals from locomotives and damage by wrecks. While the influence of these factors is felt on all classes of track from isolated sidings to the highest type of main track, tie destruction from mechanical wear of ballast seldom occurs to any appreciable extent except in occasional stretches of crushed stone, or other forms of hard ballasted tracks where a soft roadbed or a sink requires continual raising of track and tamping of ties in order to maintain good track surface. The wearing away of ties by ballast is the result of tamping the ballast under the tie and the action of the tamping tool striking the side and edge of the tie rather than the action of the tie bearing upon and working in the ballast under train loads. There is but little mechanical wear due to the tie working in the ballast.

After ties are first put into the track and tamped to surface on hard ballast, the necessity for retamping to surface and consequently the wear of the ties by ballast depends largely upon the nature of the sub-grade. Good surface and sub-surface drainage usually insures solid roadbed, where the normal bearing value of the material qualifies it for heavy loading. Where such conditions prevail, track surface is maintained with a minimum amount of tamping and the mechanical effect of the ballast on the ties is negligible. Wet cuts and fills, roadbed sinks and side hill slips produce conditions for which the track as a whole suffers. They are responsible in the majority of cases for bad surface and alignment and can, therefore, be said to be the underlying cause of tie deterioration from mechanical wear of ballast. Such conditions are usually local and limited in their extent over any stretch of track, and the total mileage of roadway involved comprises only a small percentage of the total roadway of any railroad system. The removal of the cause and the restoration of the stability of the roadway in many cases involves heavy expense, for which reason the conditions are often allowed to remain, making necessary the continual employment of forces raising the track and tamping the ties to surface. Thus the roadway conditions are responsible for the excessive tamping and wearing away of the ties. As this does not involve a relatively large number of ties, and as usually the prevention is often difficult and expensive, to some extent, this excessive track maintenance and consequent tie wear from ballast will inevitably exist as long as wooden ties are used.

Ties which are removed after service in hard ballasted track are found to be pitted or indented on the bottom and sides from contact with the stone or other ballast material. These indentations in the tie are a valuable factor in holding the track in line and surface as long as they are not increased by frequent tamping. The continual tamping of the ballast under the tie soon rounds off the edges of the ties, leaving little or no flat bearing surface for support. When this happens the tie acts as a wedge and tends to force the ballast out into the cribs instead of receiving full support from it. It typifies the worst conditions. However, a tie seldom becomes rounded to this extent throughout its entire length. Figs. 1 and 2 show open cribs and the worn edge of ties inside and outside of the rail. It is to be noted that the greatest wear occurs from 6 to 8 inches either side of the rail and practically none directly under the rail.



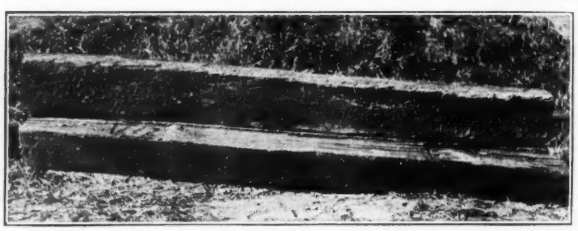
Section through tie at edge of rail flange showing how the bottom edge becomes rounded off due to excessive tamping of ballast.—Tamping around bottom tie forces the ballast in to the cribs making it difficult to pack solid under the tie.—

In track maintenance the best practice is to tamp the tie for its full bearing upon the ballast outside of the rail and for an equal distance inside of the rail. In spite of close supervision, however, this is not always done, but instead the trackman expends his efforts toward tamping up solid as near the rail as he can work with a tamping pick. This wears off the edge of the tie for some distance each side of the rail and leaves a short unworn edge directly under the rail.

When a tie becomes rounded on the bottom at the most essential tamping point and becomes difficult to maintain to surface, it is then found more economical to replace it with a new tie having a flat bottom that will necessitate less tamping. The average trackman feels little hesitancy about removing a tie for this cause when he has

difficulty in keeping it tamped. Even in cases of most excessive tamping, wear from ballast does not become objectionable until the tie has been in service from 50 to 75 per cent of what its life would be under normal conditions. The kind of ballast and kind of ties used and the standard at which a track is maintained are all important factors in the consideration. Slag and stone when crushed, form hard, sharp, angular fragments that appear, from observation, to be more destructive when tamped under wooden ties than gravel, burnt clay, cinders, granulated slag or other similar forms of ballast. Ballast of the last named materials has little or no effect in wearing down the sides and bottom of the ties nor is the tamping of this kind of ballast so destructive to the ties, as the particles are smaller, generally of softer material and rounded in form. There is a perceptible difference in the resistance offered against mechanical wear by ties made from the different kinds of wood. Hard wood ties of tough texture withstand the action of the rail cutting and of excessive tamping much longer than ties of soft wood. It has been observed that these ties which are most durable under the wear of ballast; for instance, white oak, chestnut oak, black walnut, maple and beech are more suitable than yellow pine, fir, catalpa, cedar and redwood.

Here it is important to mention the extent to which some forms of ballast increase the abrasive action of the rail upon the tie. Granulated slag, gravel, cinders, chatts and other forms of ballast carrying fine gritty particles contribute largely to the rapidity of the abrasive action



Wear on Bottom of Pine Ties from Rock Ballast.

between the rail and the tie or between the tie plate and the tie, thus greatly accelerating the mechanical wearing away of the wood. It has been observed that the cutting of the rail into the tie is much greater where the fine ballast is used than where coarse hard ballast is used. This trouble has been largely overcome by use of flanged bottom plates which become embedded in the tie, and by plates fastened directly to the tie by lag screws, independent of the rail spiking, thus reducing the movement between the plate and tie to a minimum. However, many ties are removed from track each year because of deterioration from rail wear and a large amount of this deterioration can be assigned to the effect of the fine particles of ballast grinding under the rail.

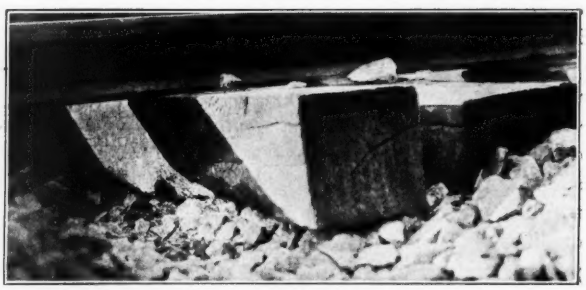
A careful study of the wearing effect of ballast upon ties during tie removal seasons where the actual cause of deterioration under roadbed and track conditions can plainly be seen, is convincing evidence that such wear along the bottom edge only injures the ties where tamping is necessary at quite frequent intervals.

Regarding the use of treated ties where extraordinary wear by ballast is known to exist the same rule might apply that is observed when the mechanical wear under the rail limits the life of the tie. Treatment to prevent decay does not give the tie increased resistance to abrasion, and ballast abrasion that is so severe as to wear out an untreated tie would preclude the possibility of any

Tamping Wear. Edge of Tie in Rock Ballast.

benefit from the use of treated ties at locations where such abrasion occurs.

In conclusion it might be said that the ballast has little direct effect on the mechanical life of the ties. The finer and lighter ballast materials, such as gravel, cinders, granulated slag, etc., hasten the rail cutting on top of the



Tamping Wear. Edge of Pine Tie in Rock Ballast.

tie by the finer particles working under the rail. The coarser and heavier ballasts, such as crushed stone and slag, bruise and cut into the bottom and the sides of the ties largely under tamping. Comparatively few ties are destroyed from this latter cause, while many more are removed from track on account of the former.

A substantial, well-drained roadbed, and a clean, hard ballast, free from fine particles and coarse enough to insure against holding water, affords the best foundation for the tie.

The desired roadbed condition must usually be made with the materials available, aided by tiling and French drains. The ballast, however, may be selected. A hard durable stone, crushed in angular fragments, in size from one inch to three inches, screened free from all dust and dirt, is the ballast that will least affect the mechanical life of the tie.

The Signal Department

Single Track Automatic Block Signals

A Single Track Installation of Automatic Block Signals on the Delaware, Lackawanna & Western. Protecting an Entire Branch and a Switchback

LOCATION.

The automatic block signals between Owego and Ithaca, New York, were placed in service on September 19th, 1914. This branch of the Lackawanna consists of a single track line, 34.4 miles long, extending from the main line at Owego, 182.7 miles east of Buffalo, in a northwesterly direction to Ithaca. The map shows the relative location of this branch to the main line.

GRADE.

The ruling grade is approximately one-half of one per cent upward from Owego to the Ithaca Switchback. From this point it is a downward grade of one and one-half per cent to Ithaca. Because of the grade the railroad is five and one-half miles in length from the station to the Switchback, while it is only a mile across the country between the two points.

CHANGE IN PRACTICE.

This installation of signals is unique in that it is the first branch or division of the railroad on which upper quadrant signals and primary battery track circuits have been used. With the completion of this installation of signals the Lackawanna now has automatic signal protection over all its main line and and on most of the branch lines of the railroad.

PLANS.

The location plan shows the sidings, crossings, switchback and signals on the Ithaca Branch. A typical wiring plan shows the controls for a few of the signals.

TRAFFIC.

The traffic on this branch is light compared to other branches and divisions of the railroad. There are five first-class and three second-class trains scheduled on week days and three first-class trains on Sunday. Through Pullman cars are handled between Ithaca and Hoboken on all first class trains. Extra trains are run in the fall, at the holiday season, and in the spring to accommodate the students of Cornell University.

LENGTH OF BLOCKS.

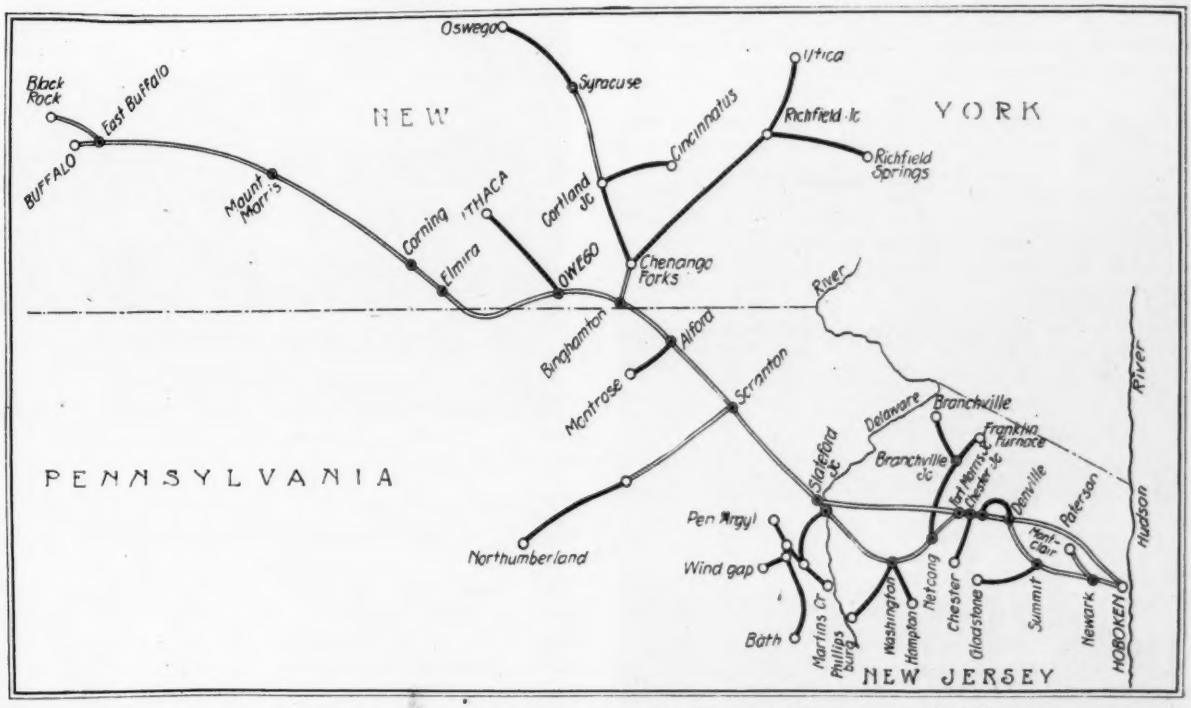
Signals are located at each end of passing tracks, except at one location C-2514-C-2515, where the signals are staggered on account of a single end siding. The mileage between passing tracks is divided into equal blocks of approximately 5,000 feet. All signals are one arm, two or three position, except two, two-arm signals at the Ithaca Switchback. Eastbound signals are arranged for an overlap of one and a half blocks and westbound signals for two blocks.

TYPE OF SIGNALS.

The automatic signals are the Union Switch & Signal Company standard Style "S," 10 volt, D C mechanism, with blade operating in the upper right hand instead of the lower right hand quadrant, as has been the practice on the other divisions of the railroad. Two General Railway Signal Company standard, type 2 A, signals are used for home signals at the Erie Interlocking plant, Owego. There are nineteen three-position, and fifty-four two-position automatic signals on the 34.4 miles of road.

RELAYS, LIGHTNING ARRESTERS AND TERMINALS.

All relays are the Union type, Model 13, and are wound to four ohm resistance for track, and six hundred ohms resistance for line circuits. The G. E. and Brach vacuum type of lightning



Map of D. L. & W., Showing Location of Single Track Line Equipped with Automatic Block Signals.

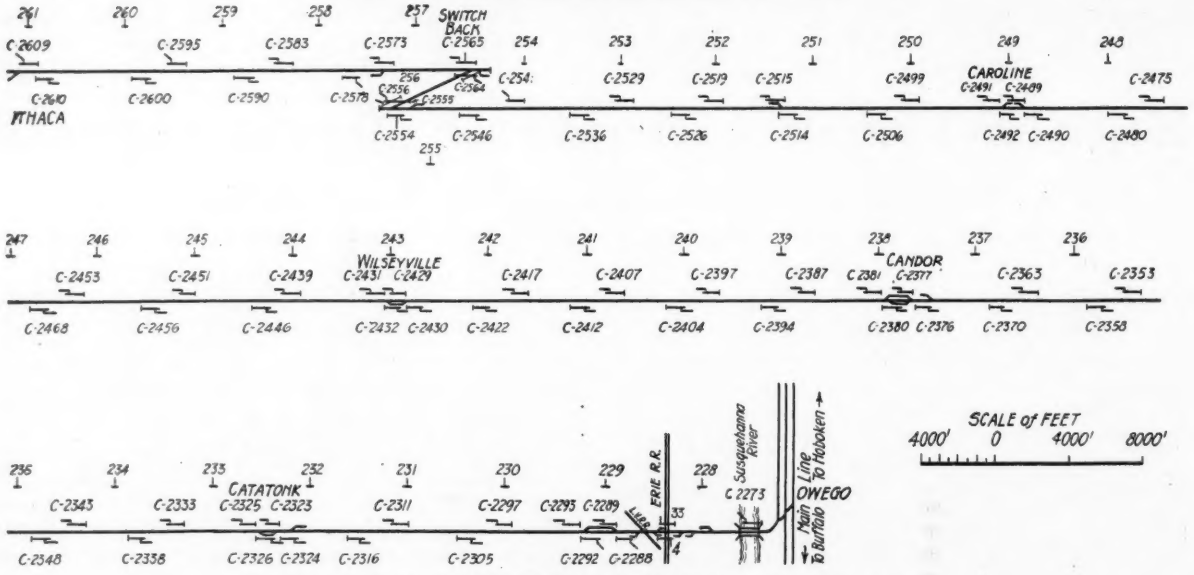


Diagram. Single Track Automatic Block Signals, Owego to Ithaca, D. L. & W.

arresters are used on line and track relay magnet circuits. The Brach improved type of terminal block is used on all circuits.

BATTERY.

The signal operating battery consists of sixteen cells, Edison BSCO battery, type 404. The line relays are operated by twelve cells of the same type of battery.

Three cells of Edison or Waterbury battery are connected in multiple on each track circuit. The Brach variable type of resistance unit is used with each set of track battery.

WIRE.

Number six Kerite wire is used for connections to track. Number nine Kerite wire is used for leads from the battery wells to the terminal boards. The cables are six conductor number twelve Kerite wire and are tied in with Mathews Cable Clips. Number nine weatherproof iron wire is used for the line circuits. The Western Union pole line is used for signal circuits, but five miles of pole line was built where the telegraph line was not available.

Fig. 1. Interlocking Signals, Erie Tower, Owego, D. L. & W.

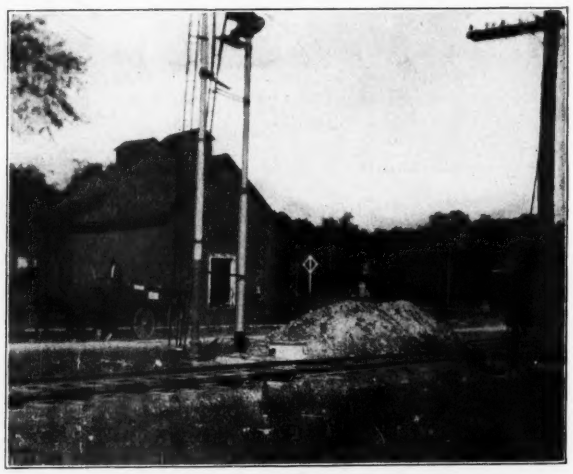


Fig. 2. Interlocking Signals at Erie Tower, Owego, D. L. & W.

BATTERY WELLS.

The style "C" Massey concrete battery well is used at signal locations for housing the signal, line and track batteries. Battery chutes are used to house the track battery at a few locations.

BLADES.

Enameled steel blades and number plates manufactured by the Signal Accessories Company are used on the signals.

SUPERVISION.

The construction work was handled by the railroad forces under the supervision of Mr. A. J. Anderson, Supervisor of Signals. The battery wells were distributed and set and the signals erected by a work train with a derrick. The material was sent to convenient points and distributed as desired. The work was carried on in the summer months with a gang of twenty men.

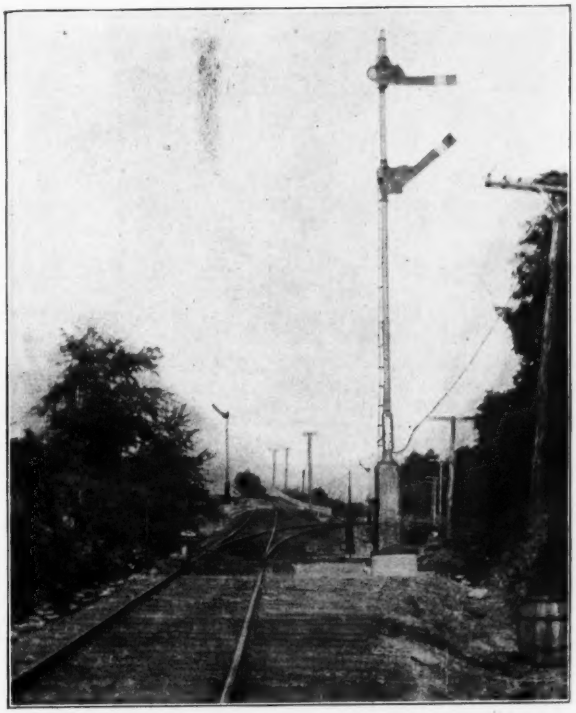
MAINTENANCE.

The maintenance force is composed of a maintainer, batteryman and a lampman for the 34.4 miles of signals.

VIEWS.

Several pictures, shown herewith, give some idea of the type of construction used on this installation.

We are indebted to M. E. Smith, signal engineer, for the information contained in this article, the installation being put in under his direction.



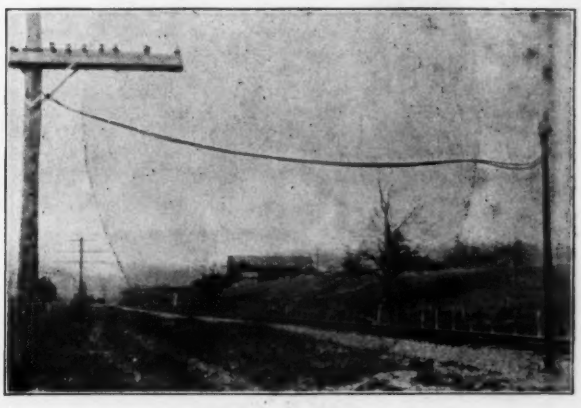
Lower End of Ithaca Switch Back, D. L. & W.

Upper End of Ithaca Switch Back, D. L. & W.

Staggered Signals at Passing Track, D. L. & W.

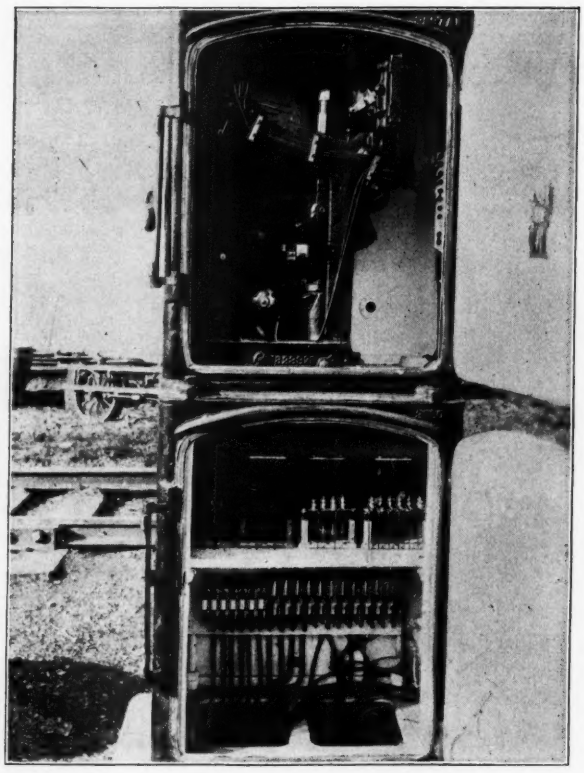
Fig. 3. Distributing Battery Wells with Derrick, D. L. & W.

End of Ithaca Switch Back, D. L. & W.



Cable Post Location, D. L. & W.

Terminal Board and Wiring of Instruments, D. L. & W.



Wiring of Mechanism and Instrument Cases, D. L. & W.

Personals

Norman Bruce Ream died in New York City on February 9th, at the Presbyterian Hospital as a result of an operation for intestinal trouble. He was a man of large affairs and was a director in the Baltimore and Ohio, Erie, Cincinnati, Hamilton and Dayton, Pere Marquette and Seaboard Air Line railways, and the Pullman company.

James M. Warner, general manager of the Chicago & Western Indiana died February 8 at 6339 Yale avenue, Chicago, Ill. Mr. Warner had become one of the most widely known railroad officials in the west. He began his career in the east at a telegraph key. From that position he rose, with the Erie, to train dispatcher and train master.

James M. Warner.

A quarter of a century ago he came west to be master of transportation for the Western Indiana. His rise with that company was steady, and he passed successively from the offices of superintendent and general superintendent to that of general manager.

Edward F. Kearney, vice-president of the Texas & Pacific Ry., New Orleans, La., has been appointed co-receiver with E. B. Pryor of the Wabash Railroad.

A. B. Greer has been appointed assistant general manager of the lines east of the Missouri River of the Chicago, Burlington and Quincy, with headquarters in Chicago.

J. W. Roberts has been appointed general superintendent of passenger transportation of the Pennsylvania Lines west, vice Charles Watts, retired on pension, with headquarters at Pittsburgh.

C. C. Hodges has been appointed superintendent of the Transylvania Division of the Southern with headquarters at Brevard, N. C.

James D. Welsh, general superintendent of the Colorado & Southern, at Denver, Colo., has resigned. He is to be succeeded by E. S. Koller, assistant general manager of the Chicago, Burlington & Quincy lines west of the Missouri river. Mr. Koller will have the title of general manager.

W. A. Webb, general manager of the Missouri, Kansas & Texas Ry., has been appointed vice-president of the company in charge of operation, with headquarters at Dallas, Tex. W. E. Williams, general superintendent, has been appointed general manager, with headquarters at Parsons, Kan.

Herbert Tozier has been appointed general superintendent of the Alaska Northern, with headquarters at Seward, Alaska.

C. E. Crosby has been appointed superintendent of the Carolina & Northwestern, in charge of transportation, maintenance of roadway and equipment, with headquarters at Chester, S. C.

A. W. Newton has been appointed assistant to the president of the Chicago, Burlington and Quincy with headquarters in Chicago.

J. W. Fletcher has been appointed engineer of the Carolina & Northwestern in charge of valuation, construction, betterment, inspection, tests and standards, with headquarters at Chester, S. C.

N. D. Moore is acting chief engineer of the Pacific Coast Railway with headquarters at Seattle, Wash.

T. W. Fatherson, assistant engineer of the Rock Island Lines at El Reno, Okla., has been appointed engineer maintenance of way of the Chicago Great Western, with headquarters at Des Moines, Iowa, succeeding C. Millard, resigned.

J. H. Cooper, assistant supervisor of the Pennsylvania, at Tyrone, Pa., has been appointed assistant supervisor of division No. 2 Philadelphia division, with office at Paoli, succeeding F. H. Bentley, promoted.

The Engineer's Distress

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A. S. Gunn Editor

TE · MORITURI · SALUTAMUS

~ by ~

A. TUNNEL · WORKMAN. ESQ.

- PAUL · M · LA · BACH -

HAPPY · THE · MAN, · WHOSE · WISH · AND · CARE
A · FEW · INFERNAL · ACRES · BOUND,
CONTENT · TO · BREATH · HIS · NATIVE · AIR
WHILE · UNDERGROUND.
NO · HERDS · WITH · MILK; NO · FIELDS · WITH · BREAD,
NO · CALM · FLOCKS · FOR · ME · TO · ADMIRE;
A · SUBWAY · WINTER · YIELDS · ME · SHADE
IN · SUMMER · FIRE.

BLEST · IS · HE · WHO · CAN · ALWAYS · FIND
HOURS, DAYS · AND · YEARS · SLIDE · SOFT · AWAY,
NOR KNOW · AT · END · OF · DAILY · GRIND,
MIDNIGHT · FROM · DAY.
SOUND · SLEEP, BY · NIGHT · OR · DAY · WITH · EASE
TOGETHER · MIXD; SUCH · RECREATION
AND · AMUSEMENT · MOST · DOTH · PLEASE —
WITH · MEDICATION.
THUS · LET · ME · LIVE, · UNSEEN, · UNKNOWN:
THUS · UNLAMENTED · LET · ME · DIE;
STEAL · FROM · THE · WORLD, AND · NOT · A · STONE
TELL · HOW · I · LIE.

A. Schupp.

With The Manufacturers

LYNDON F. WILSON, vice president of The Railway List Co., has resigned to become vice president of The Bird-Archer Co., of New York, effective April 1st, 1915.

Mr. Wilson was born at Rush Lake, Wis., November 4th, 1883, and was educated at Ripon College, Lawrence University, and the University of Wisconsin. Before entering college he was engaged as an operator in the office of his father on the Chicago, Milwaukee & St. Paul, and later, after considerable machine shop and power plant experience, he became an engineer in the service of the Interior Department of the United States Government. After one year in this service, he joined the engineering department of the Western Electric Company where he was engaged until the fall of

Lyndon F. Wilson.

1908 when he became mechanical department editor of the "Railway Review." In March, 1909, he came to The Railway List Co., as editor of the *Railway Master Mechanic* and later became editorial director of the publications of the company, namely: *The Monthly Official Railway List, Railway Engineering and Maintenance of Way, and Railway Master Mechanic.* In September, 1913, he was made a vice president of the company. Mr. Wilson has a pleasing and forceful way about him, a loyal disposition and the ability to accomplish what he undertakes. He is well acquainted with the railway and supply fields, and his former associates, in wishing him the best of good fortune, predict abundant success in his new work. After April 1st, Mr. Wilson will be located in the Chicago office of The Bird-Archer Company.

THE LACKAWANNA HOOK-SHOULDER TIE PLATE

A new form of tie plate known as the Lackawanna Hook-Shoulder Tie Plate is now being manufactured by the Lackawanna Steel Co., Lackawanna, N. Y.

Among features claimed by the manufacturers are simplicity, strength, durability, convenience in installation, provision for security and safety in construction, prevention of undue wear and destruction of other material, saving of repair expense and reduced maintenance labor.

The rail flange rests between two shoulders or ribs designed with clearance for a free fit. One of the shoulders is hook-shaped to extend over one rail flange and makes a holder between plate and rail. This hook-shoulder, as it is called, is provided with enough clearance over the rail flange for free rail wave motion across the plate.

The top surface of the plate, outside the ribs, is made to conform to the shape of head on any spike fastenings, as follows:

First—Sloping from shoulders toward edge, for common spikes.

Second—Flat, for lag screws.

Third—Slightly grooved with surfaces sloping toward the center, for standard screw spikes.

The under side of the plate is flat and may have rolled ribs or grooves, if desired.

Different sizes are made, having bearing surfaces of seventy to ninety square inches on the tie. The bearing surface here may be divided equally on both sides of the center line of the rail, or a greater part may be placed on the outer side. For example, a centrally lined plate has 50 per cent tie bearing on each side of the rail center. An ex-centrally lined plate may have 48 per cent bearing on the inner, and 52 per cent on the outer side of the rail center, or more or less as preferred.

The plate is fastened to the tie by common or screw holding spikes which are in direct contact with the plate and extend through spike holes outside the ribs without any bearing on the rail flanges. Spikes, so placed, are not disturbed by rail motion and form permanent fastenings to make the plate a part of the tie.

Holes are punched through the plain rib for common spikes, designated as guard spikes, which provide protection against the rail raising up or rolling off the plate from that side, in the event of accident. Drawing and replacing these guard spikes in the plate permits removal and relaying of the rail without, in any way, disturbing the holding spikes.

The double ribs prevent the tie from sluing out of a right angle position with the track, and the tendency of these ribs to bind against the rail flange also serves, in a measure, as an anti-creeper.

INDUSTRIAL NOTES

THE BUCYRUS COMPANY, THE WESTERN WHEELED SCRAPER COMPANY and THE GENERAL EQUIPMENT COMPANY have recently opened a joint office at 715 Commercial Trust building, Philadelphia, Pa. The office is in charge of E. G. Lewis.

THE RAILWAY SAFETY APPLIANCE COMPANY has been incorporated in Delaware by J. E. Hart, George Clare and J. D. Gray, of Chicago. The concern controls patents on railway safety devices, and has a capitalization of $1,000,000.

Contract has recently been placed with the Federal Signal Co. for the installation of a mechanical interlocking plant at Beacon, on the Hudson Division, New York Central Railroad. This consists of a 72-lever style "A" machine having 57 working and 15 spare levers, operating a standard four track interlocking layout.

THE LIBERTY RAILWAY PRODUCTS COMPANY, Chicago, Ill., has been incorporated with $22,000 capital stock to manufacture railway supplies. Geo. S. Pines, Albert G. Rosenbaum, Benjamin Mesirow, 111 West Monroe street, are the incorporators.

The Asbestos Protected Metal Co. announces the removal of its head office from Beaver Falls to First National Bank building, Pittsburgh, Pa.

The Car Lighting Co. 132 Madison avenue, New York, has been incorporated with a capital stock of $100,000 by W. H. Black, L. W. Young and W. P. Horn.

The Hewitt Company, Chicago, Ill., has succeeded to the business and assumed the contract obligations of the Hewitt Supply Company, effective January 1, 1915. C. M. Hewitt is president.

The Schaefer Equipment Co., manufacturers of the Schaefer truck lever connection and other railway specialties, has removed to Suite 2138 Oliver building, Pittsburgh, Pa.

The Spencer Otis Co., Railway Exchange building, Chicago, has now been incorporated with a capital stock of $75,000.

PUBLISHER'S ANNOUNCEMENT

From the homogeneous to the heterogeneous, from the simple to the complex, from the primitive man living alone to modern man living with due regard to others as well as himself, from savagery to civilized society, a long step from prehistoric man to the present day.

Only yesterday in the limitless measurement of time was the inception of railroading and today is its development and the completing of its growth. This rapid growth of an intricate gigantic industry, almost within the lifetime of one man, has meant the meeting and solving of more problems than have ever been given to mankind since primitive man turned his back upon his animal ancestors and set his face toward the wonderful civilization which we enjoy today.

There are many units in this forward march of the great transportation systems. A small unit, but still having its part to play, is the railway publication. One of the smallest of these is RAILWAY ENGINEERING AND MAINTENANCE OF WAY. Its size does not minimize its importance. It occupies a special position in the railway field and is performing a work not attempted by any other journal. It becomes then a necessary link in the chain.

The function of a railway publication of the character of this journal should be to furnish a medium for the intelligent discussion of the problems confronting the railway man and the solution to the problems as given by the railway supply man.

RAILWAY ENGINEERING AND MAINTENANCE OF WAY is not a paper exclusively for the railway man, nor exclusively for the railway supply man. It is for both of them and equally so.

Taking a broad view of the field occupied by this journal, without bias and without prejudice, this publication will be edited with the idea of the "greatest good to the greatest number" in the field of railway engineering and maintenance of way, bridges, buildings, contracting, signaling and track.

Publisher,
RAILWAY ENGINEERING AND MAINTENANCE OF WAY.